

LONDON- WEST MIDLANDS ENVIRONMENTAL STATEMENT

Volume 5 | Technical Appendices

CFA18 | Stoneleigh, Kenilworth and Burton Green

Water resources assessment (WR-002-018)

Water resources

November 2013

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Department
for Transport

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Appendix WR-002-018

Environmental topic:	Water resources and flood risk assessment	WR
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1 Introduction

1.1 Structure of the water resources and flood risk assessment appendices

- 1.1.1 The water resources and flood risk assessment appendices comprise four parts. The first of these is a route-wide appendix (Appendix WR-001-000).
- 1.1.2 Two specific appendices for each community forum area (CFA) are also provided. For Stoneleigh, Kenilworth and Burton Green (CFA18), these are:
- a water resources assessment (i.e. this appendix);
 - a flood risk assessment (Appendix WR-003-018); and
 - a river modelling report (appendix WR-004-011).
- 1.1.3 Maps referred to throughout the water resources and flood risk assessment appendices are contained in the Volume 5: Map Book – Water resources, Maps WR-01 to WR-06 and the Volume 5: Map Book – Ecology, Maps EC-01 to EC-04.

1.2 Study area

- 1.2.1 The study area for Stoneleigh, Kenilworth and Burton Green is located between Furzen Hill Farm and Beechwood and is within the county of Warwickshire. The study area is predominantly rural and overlies several superficial and bedrock aquifers. Topography varies from 60m to 120m above ordnance datum (mAOD).
- 1.2.2 The spatial scope of the surface water assessment was based upon the identification of surface water and groundwater features within 1km of the centreline of the Proposed Scheme, except where there is clearly no hydraulic connectivity. For surface water features in urban areas, the extent was reduced to 500m. Outside of these distances it is unlikely that direct impacts upon the water environment will be attributable to the Proposed Scheme. Where works extend more than 200m from the centreline, for example at stations and depots, professional judgement was made in selecting the appropriate limit to the extension in spatial scope required. For the purposes of this assessment this is defined as the study area.
- 1.2.3 Due to the number of ponds and other water features present within the study area, only those either within the land required for the construction or operation of the Proposed Scheme, or within the calculated zone of influence have been included in the baseline.

2 Stakeholder engagement

2.1.1 Discussions with the following stakeholders has been undertaken to inform the water resources assessment:

- the Environment Agency on 31 September 2012 to discuss multiple aspects of the Proposed Scheme;
- the Environment Agency on 21 December 2012; and
- the Environment Agency and Warwickshire Lead Local Flood Authority (LLFA) on 4 June 2013.

3 Baseline data

3.1 General

- 3.1.1 The following section provides a current description of water resources including surface water and groundwater.

3.2 Surface water features

- 3.2.1 All surface water features within 1km of the route are presented in Table 1.
- 3.2.2 The current surface water baseline is shown in the Volume 5: Maps WR-01-030 and WR-01-031. Where a water feature in Table 1 has been given a map reference it appears on one of these maps.

Appendix WR-002-018 | Baseline data

Table 1: Surface water features within 1km of the route in CFA18

Water feature ¹	Location description (map reference) ²	Watercourse classification ³	Water Framework Directive (WFD) water body name and identifier and overall status	WFD status objective (by 2027 ⁴ as per River Basin Management Plan (RBMP ⁵), unless stated)	Receptor value ⁶	Q95 ⁷	Catchment	Size	Notes
Tributary of River Avon	At Furzen Hill Farm (Coventry Road), 280m north-east of the route Map WR-01-030 (H6)	Ordinary watercourse	River Avon – Claycoton Yelvertoft Brook to confluence River Sowe (GB109054043920) Poor status	Good status	Moderate	-	River Avon	-	Will not be crossed by the route.
Drain	South of Weston Woods, 340m north-east of the route Map WR-01-030 (H6)	Ordinary watercourse	River Avon – Claycoton Yelvertoft Brook to confluence River Sowe (GB109054043920) Poor status	Good status	Moderate	-	River Avon	-	Will not be crossed by the route.
Drain	In Waverley Wood, 820m north-east of the route Map WR-01-030 (H5)	Ordinary watercourse	River Avon – Claycoton Yelvertoft Brook to confluence River Sowe (GB109054043920) Poor status	Good status	Moderate	-	River Avon	-	Will not be crossed by the route.

¹ Only ponds located in the land required for the permanent Proposed Scheme are listed in this table.

² Map references taken from Volume 5: Map Book – Water resources, Maps WR-01-030 and WR-01-031.

³ Environment Agency water-feature classification: The Land Drainage Act 1991 defines an Ordinary watercourse as 'A watercourse that is not part of a main river, all rivers and streams, ditches, drains, cuts, culverts, dikes, sluices, sewers (other than public sewers) and passages through which water flows'. 'Main Rivers' are larger rivers and streams designated by DEFRA, main rivers are regulated by the Environment Agency.

⁴ Year may vary in different RBMPs.

⁵ The Environment Agency (2009) *River Basin Management Plan – Severn River Basin District* (p14).

⁶ For examples of receptor value see Table 43 in the SMR addendum Volume 5 Appendix CT-001-000/2.

⁷ Q95 flow values only provided for water features crossed by the route.

Water feature ¹	Location description (map reference) ²	Watercourse classification ³	Water Framework Directive (WFD) water body name and identifier and overall status	WFD status objective (by 2027 ⁴ as per River Basin Management Plan (RBMP ⁵), unless stated)	Receptor value ⁶	Q95 ⁷	Catchment	Size	Notes
Tributary of River Avon	At Cotton Mill Spinney, 450m south-west of the route Map WR-01-030 (G7)	Ordinary watercourse	River Avon (Warks) – confluence River Sowe to confluence River Leam (GB109054043840) Poor status	Good status	Moderate	-	River Avon	-	Will not be crossed by the route.
Tributary of River Avon	At Leicester Lane, 410m north-east of the route Map WR-01-030 (H5)	Ordinary watercourse	River Avon – Claycoton Yelvertoft Brook to confluence River Sowe (GB109054043920) Poor status	Good status	Moderate	-	River Avon	-	Will not be crossed by the route.
Tributary of River Avon	At Yew Tree Cottage, 630m north-east of the route Map WR-01-030 (G5)	Ordinary watercourse	River Avon – Claycoton Yelvertoft Brook to confluence River Sowe (GB109054043920) Poor status	Good status	Moderate	-	River Avon	-	Will not be crossed by the route.
Tributary of River Avon	At Hares Parlour, 295m south-west of the route Map WR-01-030 (F6)	Ordinary watercourse	River Avon (Warks) – confluence River Sowe to confluence River Leam (GB109054043840) Poor status	Good status	Moderate	-	River Avon	-	Will not be crossed by the route.
Drain	At Stare Bridge, 320m north-east of the route Map WR-01-030 (F5)	Ordinary watercourse	River Avon – Claycoton Yelvertoft Brook to confluence River Sowe (GB109054043920) Poor status	Good status	Moderate	-	River Avon	-	Will not be crossed by the route.

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Water feature ¹	Location description (map reference) ²	Watercourse classification ³	Water Framework Directive (WFD) water body name and identifier and overall status	WFD status objective (by 2027 ⁴ as per River Basin Management Plan (RBMP ⁵), unless stated)	Receptor value ⁶	Q95 ⁷	Catchment	Size	Notes
Tributary of River Avon	At Stareton, 540m north-east of the route Map WR-01-030 (F5)	Ordinary watercourse	River Avon – Claycoton Yelvertoft Brook to confluence River Sowe (GB109054043920) Poor status	Good status	Moderate	-	River Avon	-	Will not be crossed by the route.
Tributary of River Avon	Downstream of Hares Parlour, 820m south-west of the route Map WR-01-030 (F7)	Ordinary watercourse	River Avon (Warks) – confluence River Sowe to confluence River Leam (GB109054043840) Poor status	Good status	Moderate	-	River Avon	-	Will not be crossed by the route.
River Avon	At Sowe Mouth, 70m north-east of the route Map WR-01-030 (E5)	Main river	River Avon – Claycoton Yelvertoft Brook to confluence River Sowe (GB109054043920) Poor status	Good status	High	-	River Avon	-	Will not be crossed by the route.
Drain	At Home Farm, 630m south-west of the route Map WR-01-030 (F7)	Ordinary watercourse	River Avon (Warks) – confluence River Sowe to confluence River Leam (GB109054043840) Poor status	Good status	Moderate	-	River Avon	-	Will not be crossed by the route.
Drain	At Vicarage Road, 645m north-east of the route Map WR-01-030 (E4)	Ordinary watercourse	River Sowe – confluence Smite Brook to confluence River Avon (GB109054044540) Poor status	Good status	Moderate	-	River Sowe	-	Will not be crossed by the route.

Water feature ¹	Location description (map reference) ²	Watercourse classification ³	Water Framework Directive (WFD) water body name and identifier and overall status	WFD status objective (by 2027 ⁴ as per River Basin Management Plan (RBMP ⁵), unless stated)	Receptor value ⁶	Q95 ⁷	Catchment	Size	Notes
River Avon	At Sowe Mouth Plantation, will be crossed by the route Map WR-01-030 (E5), reference SWC-CFA18-001	Main river	River Avon (Warks) – confluence River Sowe to confluence River Leam (GB109054043840) Poor status	Good status	High	0.48m ³ /s	River Avon	347km ²	Gauged data from National River Archive – (station identifier 54019 – Avon at Stareton).
River Sowe	At Sowe Mouth Stoneleigh Hill, 340m north-east of the route Map WR-01-030 (E5)	Main river	River Sowe – confluence Smithe Brook to confluence River Avon (GB109054044540) Poor status	Good status	High	-	River Sowe	-	Will not be crossed by the route.
Tributary of River Avon	At Crewe Farm, 510m south-west of the route Map WR-01-030 (E6)	Ordinary watercourse	River Avon (Warks) – confluence River Sowe to confluence River Leam (GB109054043840) Poor status	Good status	Moderate	-	River Avon	-	Will not be crossed by the route.
Tributary of River Avon	Abutting the B4115 Ashow Road, 180m south-west of the route Map WR-01-030 (E6)	Ordinary watercourse	River Avon (Warks) – confluence River Sowe to confluence River Leam (GB109054043840) Poor status	Good status	Moderate	-	River Avon	-	Will not be crossed by the route.
Finham Brook	At Dalehouse Farm, will be crossed by the route Map WR-01-030 (C5), reference SWC-CFA18-002	Main river	Finham Brook – confluence Canley Brook to confluence River Sowe (GB109054044480) Moderate status	Good status	High	1.189m ³ /s	River Sowe	262km ²	Gauged data from National River Archive – (station identifier 54404 – Sowe at Stoneleigh).

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Water feature ¹	Location description (map reference) ²	Watercourse classification ³	Water Framework Directive (WFD) water body name and identifier and overall status	WFD status objective (by 2027 ⁴ as per River Basin Management Plan (RBMP ⁵), unless stated)	Receptor value ⁶	Q95 ⁷	Catchment	Size	Notes
Finham Brook	At Meadow Farm, 380m south-west of the route Map WR-01-030 (C6)	Main river	Finham Brook – source to confluence Canley Brook (GB109054044470) Good Status	Good status	High	-	River Sowe	-	Will not be crossed by the route.
Pond	At Dalehouse Farm, 40m south-west of the route Map EC-04-048 (C5)	Not applicable	Not applicable	Not applicable	Refer to ecology Volume 2, CFA Report 18, Section 7	-	-	-	Will not be crossed by the route.
Pond	At Dalehouse Farm, 40m south-west of the route Map EC-04-048 (C5)	Not applicable	Not applicable	Not applicable	Refer to ecology Volume 2, CFA Report 18, Section 7	-	-	-	Will not be crossed by the route.
Pond	South east of Milburn Grange, 40m north-east of the route Map EC-04-048 (C5)	Not applicable	Not applicable	Not applicable	Refer to ecology Volume 2, CFA Report 18, Section 7	-	-	-	Will not be crossed by the route.
Tributary of Canley Brook	At Crackley, 290m south-west of the route Map WR-01-031 (H5)	Ordinary watercourse	Canley Brook – source to confluence with Finham Brook (GB109054044520) Moderate status	Good status	Moderate	-	River Sowe	-	Will not be crossed by the route.

Water feature ¹	Location description (map reference) ²	Watercourse classification ³	Water Framework Directive (WFD) water body name and identifier and overall status	WFD status objective (by 2027 ⁴ as per River Basin Management Plan (RBMP ⁵), unless stated)	Receptor value ⁶	Q95 ⁷	Catchment	Size	Notes
Canley Brook	Upstream of Crackley Bridge, will be crossed by the route Map WR-01-031 (H5), reference SWC-CFA18-003	Main river	Canley Brook – source to confluence with Finham Brook (GB109054044520) Moderate status	Good status	High	0.048m ³ /s	River Sowe	24km ²	
Tributary of Canley Brook	At Oak Tree Cottage, 300m north-east of the route Map WR-01-031 (G4)	Ordinary watercourse	Canley Brook – source to confluence with Finham Brook (GB109054044520) Moderate status	Good status	Moderate	-	River Sowe	-	Will not be crossed by the route.
Drain	At Cryfield Grange Farm, 975m north-east of the route Map WR-01-031 (G4)	Ordinary watercourse	Canley Brook – source to confluence with Finham Brook (GB109054044520) Moderate status	Good status	Moderate	-	River Sowe	-	Will not be crossed by the route.
Tributary of Canley Brook	At Birches Wood Farm, will be crossed by the route Map WR-01-031 (G5), reference SWC-CFA18-004	Ordinary watercourse	Canley Brook – source to confluence with Finham Brook (GB109054044520) Moderate status	Good status	Moderate	0.002m ³ /s	River Sowe	0.87km ²	No FEH catchment – calculated from topographic data.
Pond	South of South Hurst Farm, will be crossed by the route (SWC-CFA18-005) Map WR-01-031 (F5)	Not applicable	Not applicable	Not applicable	Refer to ecology Volume 2, CFA Report 18, Section 7	-	-	-	

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Water feature ¹	Location description (map reference) ²	Watercourse classification ³	Water Framework Directive (WFD) water body name and identifier and overall status	WFD status objective (by 2027 ⁴ as per River Basin Management Plan (RBMP ⁵), unless stated)	Receptor value ⁶	Q95 ⁷	Catchment	Size	Notes
Pond	At South Hurst Farm, 30m north-east of the route Map EC-04-49 (F5)	Not applicable	Not applicable	Not applicable	Refer to ecology Volume 2, CFA Report 18, Section 7	-	-	-	Will not be crossed by the route.
Tributary of Canley Brook	At Broadwells Wood, will be crossed by the route (SWC-CFA18-006) Map WR-01-031 (E6)	Ordinary watercourse	Canley Brook – source to confluence with Finham Brook (GB109054044520) Moderate status	Good status	Moderate	0.001m ³ /s	River Sowe	0.321km ²	Flow data obtained from topographic data and Low Flows.
Lake	On Bockendon Grange Farm, 380m north-east of the route Map WR-01-031 (E5)	Ordinary watercourse	Canley Brook – source to confluence with Finham Brook (GB109054044520) Moderate status	Good status	Moderate	-	-	-	Will not be crossed by the route.
Tributary of Canley Brook	At Bockendon Road, 670m north-east of the route Map WR-01-031 (E4)	Ordinary watercourse	Canley Brook – source to confluence with Finham Brook (GB109054044520) Moderate status	Good status	Moderate	-	River Sowe	-	Will not be crossed by the route.
Tributary of Canley Brook	At Burton Green / Black Waste Wood, will be crossed by the route (SWC-CFA18-007) Map WR-01-031 (D6)	Ordinary watercourse	Canley Brook – source to confluence with Finham Brook (GB109054044520) Moderate status	Good status	Moderate	0.048m ³ /s	River Sowe	24km ²	Flow data adopted from main river Canley Brook crossing (CFA18-SWC-003)

Water feature ¹	Location description (map reference) ²	Watercourse classification ³	Water Framework Directive (WFD) water body name and identifier and overall status	WFD status objective (by 2027 ⁴ as per River Basin Management Plan (RBMP ⁵), unless stated)	Receptor value ⁶	Q95 ⁷	Catchment	Size	Notes
Tributary of Finham Brook	At Moat Farm, 960m south-west of the route Map WR-01-031 (D7)	Ordinary watercourse	Finham Brook – source to confluence Canley Brook (GB109054044470) Good Status	Good status	Moderate	-	River Sowe	-	Will not be crossed by the route.
Drain	At Moat Farm, 940m south-west of the route Map WR-01-031 (D7)	Ordinary watercourse	Finham Brook – source to confluence Canley Brook (GB109054044470) Good Status	Good status	Moderate	-	River Sowe	-	Will not be crossed by the route.
Watercourse	At Odnall End Farm, 40m north-east of the route Map WR-01-031 (B6)	Ordinary watercourse	River Blythe from Temple Balsall Brook to Patrick Bridge (GB104028042571) Moderate status	Good status	Moderate	-	River Sowe	-	Will not be crossed by the route.

3.2.3 Table 2 summarises licensed surface water abstractions within 1km of the route⁸. Information from Warwick District Council indicates that there are no unlicensed abstractions from surface water used for potable supply in their records.

Table 2: Licensed surface water abstractions

Licence identifier (map reference number ⁹ and Environment Agency reference)	Distance from route	Abstraction source	Maximum annual abstraction quantity	Maximum daily abstraction quantity	Purpose
18/54/10/0188 Map WR-01-030 (F5)	550m north-east of the route	Stoneleigh Park, Stoneleigh, Warwickshire – River Avon (2)	161,390m ³	2,618m ³	Agriculture
18/54/13/0155 Map WR-01-030 (F4)	920m north-east of the route	Stoneleigh Park, Kenilworth – River Avon (1 – Reach)	90,909m ³	1,090m ³	Agriculture
18/54/13/0154 Map WR-01-030 (E5)	330m north-east of the route	Stoneleigh, Warwickshire – River Sowe (2)	409m ³	300m ³	Agriculture
18/54/13/0154 Map WR-01-030 (E5)	470m north-east of the route	Stoneleigh, Warwickshire – River Sowe (1)	409m ³	300m ³	Agriculture
18/54/11/0123 Map WR-01-030 (D3)	980m north-east of the route	Newera Farm, Stoneleigh – Finham Brook	Unknown	Unknown	Agriculture
18/53/11/0121 Map WR-01-030 (C4)	270m north-east of the route	Land at Stoneleigh, Finham Brook	Unknown	Unknown	Agriculture
18/54/11/0116 Map WR-01-030 (C4)	370m north-east of the route	Not provided	Unknown	Unknown	Agriculture
18/54/11/0142 Map WR-01-030 (G4)	500m north-east of the route	Not provided	Unknown	Unknown	Agriculture

3.2.4 Table 3 summarises surface water discharge permits within 1km of the route.

Table 3: Environmental permits for surface water discharge

Reference number and map reference ¹⁰	Permit identifier	Distance from route	Discharge type	Receiving water body
32521814 Map WR-01-030 (F5)	S/10/26157/S	550m north-east of the route	Sewage discharge	River Avon
32521815 Map WR-01-030 (F5)	S/10/26499/S	550m north-east of the route	Sewage discharge	River Avon
27246051 Map WR-01-030 (F5)	S/10/26157/S	550m north-east of the route	Sewage discharge	River Avon

⁸ Surface water abstractions for public supply are not included.

⁹ Map references taken from Volume 5: Map Book – water resources, Maps WR-01-030 and WR-01-031.

¹⁰ Map references taken from Volume 5: Map Book – water resources, Maps WR-01-030 and WR-01-031.

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Reference number and map reference ¹⁰	Permit identifier	Distance from route	Discharge type	Receiving water body
1478619 Map WR-01-030 (E6)	S/13/11363/S	545m south-west of the route	Sewage discharge	Tributary of River Avon
1478716 Map WR-01-030 (D4)	S/11/22118/S	785m north-east of the route	Sewage discharge	Finham Brook
49138797 Map WR-01-030 (D4)	Npswqd003027	585m north-east of the route	Sewage discharge	Finham Brook
1478618 Map WR-01-030 (C6)	S/11/07065/O	465m south-west of the route	Sewage discharge	Finham Brook
1478560 Map WR-01-031 (H4)	CS/11/08833/S 1	990m north-east of the route	Sewage discharge	Wainbody Brook
1478575 Map WR-01-031 (H4)	S/11/08833/S	990m north-east of the route	Sewage discharge	Tributary of River Sowe
1478572 Map WR-01-031 (H5)	S/11/05984/O	175m south-west of the route	Sewage discharge	Canley Brook
96122502 Map WR-01-031 (H5)	Tsc3281	210m south-west of the route	Sewage discharge	Corley Brook
1478565 Map WR-01-031 (H5)	***095	170m south-west of the route	Sewage discharge	Canley Brook
96122306 Map WR-01-031 (H5)	Tsc585	170m south-west of the route	Sewage discharge	Canley Brook
1470990 Map WR-01-031 (G4)	S/11/23111/S	650m north-east of the route	Sewage discharge	Canley Brook
1470970 Map WR-01-031 (G4)	S/11/05998/S/2	655m north-east of the route	Surface water discharge	Canley Brook
1470976 Map WR-01-031 (G4)	S/11/05998/S	660m north-east of the route	Sewage discharge	Canley Brook
1470948 Map WR-01-031 (G4)	S/11/05998/S/1	660m north-east of the route	Surface water discharge	Canley Brook
1470980 Map WR-01-031 (F6)	S/11/21654/S	385m south-west of the route	Sewage discharge	Tributary of Canley Brook
1470991 Map WR-01-031 (F6)	S/11/23152/S	695m south-west of the route	Sewage discharge	Tributary of Canley Brook
1470510 Map WR-01-031 (E5)	S/11/10921/T	625m north-east of the route	Trade discharge	Tributary of Canley Brook
1470514 Map WR-01-031 (E5)	S/11/10921/T	625m north-east of the route	Sewage discharge	Tributary of Canley Brook
1470505 Map WR-01-031 (E5)	S/11/10921/T	625m north-east of the route	Trade discharge	Tributary of Canley Brook
35634818 Map WR-01-031 (D6)	S/11/26691/S	545m south-west of the route	Sewage discharge	Unnamed tributary Finham Brook
1470501 Map WR-01-031 (D6)	S206/2/1	455m south-west of the route	Sewage discharge	Cryfield Brook

Reference number and map reference ¹⁰	Permit identifier	Distance from route	Discharge type	Receiving water body
1470426 Map WR-01-031 (D6)	S/11/04606/S	450m south-west of the route	Sewage discharge	Cryfield Brook
14201054 Map WR-01-031 (D6)	S/11/25663/S	675m south-west of the route	Sewage discharge	Ditch tributary of Finham Brook
1470520 Map WR-01-031 (D4)	S/11/23024/S	990m north-east of the route	Sewage discharge	Tributary of Canley Brook
1470471 Map WR-01-031 (C6)	T/11/02536/S	280m south-west of the route	Sewage discharge	River Blythe (tributary)
31293007 Map WR-01-031 (C5)	S/11/26474/S	475m north-east of the route	Sewage discharge	Unnamed tributary of River Sowe

3.3 Groundwater

- 3.3.1 Groundwater within the study area lies primarily within the Warwickshire Avon Coal Measures Coventry Groundwater Body (GB40902G302200) which is currently classified as being of poor chemical and quantitative quality. It is predicted to be of poor chemical and quantitative quality in 2015.
- 3.3.2 The southernmost area from Furzen Hill Farm on Coventry Road, (approximately 2km north-east of Cubbington) to Stareton lies within the Warwickshire Avon – PT Sandstone Warwick/Avon Confined Groundwater Body (GB40901G300700) which is currently designated as being of good (deteriorating) chemical quality and of poor quantitative quality. It is predicted to be of poor chemical and quantitative quality by 2015.
- 3.3.3 Several superficial aquifers are located within the study area. These are: alluvium, river terrace deposits, Bagington Sand and Gravel Formation and glaciofluvial superficial deposits which are designated as Secondary A aquifers. These aquifers are of moderate value. There are additional till and Oadby Member superficial deposits within the study area that are classed as Unproductive strata. These deposits are of low value.
- 3.3.4 Several underlying bedrock aquifers are located within the study area. These are the Principal aquifers of the Bromsgrove Sandstone Formation, Kenilworth Sandstone Formation, Ashow Formation and the Tile Hill Mudstone Formation which are of high value. The dolomitic siltstone of the Mercia Mudstone Group, also within the study area is classified as a Secondary undifferentiated aquifer which is of moderate value.
- 3.3.5 The route will cross a catchment source protection zone³ (SPZ₃) north of Cubbington, between where the Coventry Road crosses the route and 50m south of Park Farm at Stareton and is associated with a groundwater abstraction at Lillington in Cubbington. A SPZ₃ is defined by the Environment Agency as "the area around a source within which all groundwater recharge is presumed to be discharged at the source". Another SPZ₃ will be crossed by the route north of Kenilworth, between the northern boundary of Stoneleigh Industrial Park and Broadwells Wood and is associated with groundwater abstractions at Mill End in Ladyes Hill, approximately 500m north of

Kenilworth and at Birmingham Road in Camp Farm, approximately 1km north-west of Kenilworth.

3.3.6 Table 4 summarises licensed groundwater abstractions within the study area. Precise locations of public water supplies are not provided for national security reasons.

3.3.7 There is one unlicensed potable supply within the study area.

Table 4: Groundwater abstractions

Licence number (map reference number ¹¹ and Environment Agency reference)	Distance from route	Abstraction horizon	Maximum annual abstraction quantity	Maximum daily abstraction quantity	Number of boreholes	Purpose
18/54/10/0133 Furzen Hill Farm Well 2, near Coventry Road Map WR-02-018 (H5), 1.4km south-east of Stareton	400m north-east of the route	Likely to be from the dolomitic siltstone of the Mercia Mudstone Group	5,905.8m ³	23m ³	1	Agriculture – general farming and domestic
18/54/10/0133 Furzen Hill Farm Well 1, near Coventry Road Map WR-02-018 (H5), 1.4km south-east of Stareton	400m north-east of the route	Likely to be from the mudstone of the Bromsgrove Sandstone Formation	5,905.8m ³	23m ³	1	Agriculture – general farming and domestic Licensed for domestic use
18/54/11/0098 Near Crew Lane and Kenilworth Golf Club Map WR-02-018 (F6), 700m south-west of Finham Brook viaduct	730m south-west of the route	Likely to be from the mudstone and sandstone of the Ashow Formation	More than 20m ³	More than 20m ³	1	Industrial, commercial and public services – spray irrigation
Groundwater SPZ Location MDo86 Map WR-02-018 (F6), near Mill End, Crackley	1,200m south-west of the route	Likely to be from the sandstone of the Kenilworth Sandstone Formation	Unknown	Unknown	Unknown	Public Water Supply

3.3.8 Table 5 summarises environmental permits for groundwater discharge within the study area.

¹¹ Map references taken from Volume 5: Map Book – water resources, Map WR-02-018.

Table 5: Groundwater discharge environmental permits

Reference number and map reference ¹²	Permit identifier	Distance from route	Discharge type	Receiving water body
WQ/72/56/1 At Park Farm in Stareton, east of Stoneleigh Park Map WR-02-018 (H5), Stareton	1478578	500m north-east of the route	Sewage effluent	Groundwater
WQ/72/3326/1 The Cottage at Dalehouse Lane, in Kingswood, adjacent to Finham Brook Map WR-02-018 (F5), 400m east of Finham Brook viaduct	1478545	400m north-east of the route	Sewage effluent	Groundwater
S/11/26657/Sg Kenilworth Lawn Tennis and Squash Club Map WR-02-018 (E6), Crackley	35295492	960m south-west of the route	Sewage discharge	Groundwater
Wq/72/2281 Kenilworth Lawn Tennis and Squash Club Map WR-02-018 (E6), Crackley	1470944	970m south-west of the route	Sewage discharge	Groundwater
WQ/72/3643/1 Two Oaks at Red Lane Map WR-02-018 (D6), 300m south of Burton Green	1470462	164m south-west of the route	Sewage effluent	Groundwater

Groundwater/surface water interaction

3.3.9 Table 6 summarises springs, sinks and issues (locations where groundwater rises to the surface in a more diffuse way than at a spring) within the study area. Due to the number of ponds and other water features present within the study area, only those within the land required for the construction or operation of the Proposed Scheme, or within the calculated zone of influence are included in Table 6.

Table 6 : Groundwater/surface water interaction

Location description and map reference ¹³	Distance from route	Formation	Elevation	Comments
Stream adjacent to Leicester Lane Map WR-02-018 (H5), 1.1km south-east of Stareton	200m north-east of the route	Dolomitic siltstone and mudstone of the Mercia Mudstone Group and mudstone of the Bromsgrove Sandstone Formation	Not applicable	May receive baseflow from Secondary B and Secondary undifferentiated and Principal aquifers.

¹² Map references taken from map Volume 5: Map Book – Water resources, Map WR-02-018.

¹³ Map references taken from Volume 5: Map Book – water resources, Map WR-02-018 and Volume 5: Map Book – ecology, Maps EC-04-047 to EC-04-050a.

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Location description and map reference ¹³	Distance from route	Formation	Elevation	Comments
Pond near Furzen Hill Farm, adjacent to Coventry Road Map EC-04-047 (I5), 1.6km south-east of Stareton	340m north-east of the route	Dolomitic siltstone and mudstone of the Mercia Mudstone Group	74mAOD	Unlikely to be groundwater dependent as located on elevated topography adjacent to a road. Likely to be surface water and rainfall dependent.
Pond near Furzen Hill Farm Map EC-04-047 (H6), 1.6km south-east of Stareton	100m north-east of the route	Dolomitic siltstone of the Mercia Mudstone Group	75mAOD	Unlikely to be groundwater dependent as located on elevated topography. Likely to be surface water and rainfall dependent.
Pond near Leicester Lane Map EC-04-047 (H7), 1.4km south of Stareton	160m south-west of the route	Mudstone of the Bromsgrove Sandstone Formation	70mAOD	May not be groundwater dependent as located on mudstone.
Pond Map EC-04-047 (G6), 1km south of Stareton	145m north-east of the route	Sandstone of the Bromsgrove Sandstone Formation overlain by river terrace deposits	70mAOD	Potentially groundwater dependent as located on permeable superficial deposits.
Two ponds near Stonehouse Farm Identifiers: 030-AA-137001 and 030-AA-137003 Map EC-04-047 (F7), 880m south of Stareton	165m south-west of the route	Sandstone of the Bromsgrove Sandstone Formation	72mAOD	Unlikely to be groundwater dependent as located on elevated topography. Likely to be surface water and rainfall dependent.
Pond Map EC-04-047 (D7), 650m south-west of Stareton	150m south-west of the route	Mudstone and sandstone of the Ashow Formation	60mAOD	Potentially groundwater dependent as located on permeable bedrock within a valley.
Issues at Hares Parlour near B4113 Stoneleigh Road Map WR-02-018 (G6), 780m west of Stareton	300m south-west of the route	Mudstone and sandstone of the Ashow Formation	60mAOD	May receive groundwater from Ashow Formation, Principal aquifer.
Sinks and issues west of Hares Parlour Map WR-02-018 (G6), 900m south-west of Stareton	520m south-west of the route	Mudstone and sandstone of the Ashow Formation	57mAOD	This feature appears to be a culvert, therefore not likely to be groundwater dependent.
Pond at northern edge of Stoneleigh Park Map EC-04-047 (B6), 300m south-east of River Avon viaduct	125m north-east of the route	Sandstone of the Kenilworth Sandstone Formation overlain by river terrace deposits	60mAOD	May receive baseflow from Principal aquifer overlain by Secondary A aquifer and located within a valley.
Issues near Glasshouse Wood Map WR-02-018 (G6), 1.35km south-west of River Avon viaduct	1,350m south-west of the route	Mudstone and sandstone of the Ashow Formation	65mAOD	May receive groundwater from Ashow Formation Principal aquifer.

Location description and map reference ¹³	Distance from route	Formation	Elevation	Comments
River Avon is within the study area from Cubbington to Stoneleigh Maps EC-01-047 and EC-01-048 (I5), will be crossed by the River Avon viaduct	Will be crossed by the route	Also a water dependent habitat. Refer to Table 7 for further information.		
Spring adjacent to the River Sowe Map WR-02-018 (G5), 500m north-east of River Avon viaduct	500m north-east of the route	Sandstone of the Kenilworth Sandstone Formation overlain by alluvium	55mAOD	May receive groundwater from Principal aquifer or the superficial deposits. Spring not located at boundary of deposits.
Pond Map EC-04-048 (G5), 700m north-west of River Avon viaduct	110m north-east of the route	Sandstone and mudstone of the Kenilworth Sandstone Formation	75mAOD	Potentially groundwater dependent as may receive baseflow from Principal aquifer as located within a valley.
Issues near Crewe Gardens Map WR-02-018 (F6), 1.3km west of River Avon viaduct	1,050m south-west of the route	Mudstone and sandstone of the Ashow Formation	80mAOD	May receive groundwater from Ashow Formation, Principal aquifer.
Pond near Kingswood Farmhouse Map EC-04-048 (G5), 920m north-west of River Avon viaduct	155m north-east of the route	Sandstone of the Kenilworth Sandstone Formation	80mAOD	Potentially groundwater dependent as may receive baseflow from Principal aquifer as located within a valley.
Pond near New Kingswood Farm Identifier 030-AA-141003 Map EC-04-048 (F6), 280m south of Finham Brook viaduct	145m south-west of the route	Mudstone and sandstone of the Ashow Formation	85mAOD	Unlikely to be groundwater dependent as located on elevated topography. Likely to be surface water and rainfall dependent.
Pond near Dalehouse Lane Map EC-04-048 (F5), 220m east of Finham Brook viaduct	150m north-east of the route	Sandstone of the Kenilworth Sandstone Formation	80mAOD	Potentially groundwater dependent as may receive baseflow from Principal aquifer as located within a valley.
Finham Brook alongside Dalehouse Lane, near Kenilworth Map EC-01-048 (E6), will be crossed by Finham Brook viaduct	Will be crossed by the route	Also a water dependent habitat. Refer to Table 7 for further information.		
Two ponds near Dalehouse Farm Map EC-04-048 (D6), 250m north-west of Finham Brook viaduct	Less than 50m south-west of the route	Mudstone of the Kenilworth Sandstone Formation	75mAOD	Unlikely to be groundwater dependent as located on elevated topography. Likely to be surface water and rainfall dependent.

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Location description and map reference ¹³	Distance from route	Formation	Elevation	Comments
Pond near Dalehouse Farm Map EC-04-048 (D6), 330m north-west of Finham Brook viaduct	80m south west of the route	Mudstone of the Kenilworth Sandstone Formation	75mAOD	Unlikely to be groundwater dependent as located on elevated topography. Likely to be surface water and rainfall dependent.
Pond near Dalehouse Farm Identifier 030-AA-141002 Map EC-04-048 (D6), 400m north-west of Finham Brook viaduct	Less than 60m north-east of the route	Mudstone of the Kenilworth Sandstone Formation	75mAOD	Potentially groundwater dependent as may receive baseflow from Principal aquifer as located within a valley.
Pond near Dalehouse Farm Map EC-04-048 (D7), 420m north-west of Finham Brook viaduct	115m south-west of the route	Mudstone of the Kenilworth Sandstone Formation	75mAOD	Pond not found during Phase 1 Survey and therefore not assessed further. Refer to ecology Volume 2, CFA Report 18, Section 7.
Pond near Milburn Grange Map EC-04-048 (D7), 550m north-west of Finham Brook viaduct	100m south-west of the route	Sandstone of the Kenilworth Sandstone Formation	75mAOD	Pond not found during Phase 1 Survey and therefore not assessed further. Refer to ecology Volume 2, CFA Report 18, Section 7.
Two ponds adjacent to Coventry to Leamington Spa Line Map EC-04-048 (C6), near Coventry-Leamington Spa Line Overbridge.	50m north-east of the route	Sandstone and mudstone of the Kenilworth Sandstone Formation	70mAOD	Ponds not found during Phase 1 Survey and therefore not assessed further. Refer to ecology Volume 2, CFA Report 18, Section 7.
Issues in Crackley Map WR-02-018 (E6)	385m south-west of the route	Sandstone of the Kenilworth Sandstone Formation	72mAOD	Likely to be a culvert and therefore unlikely to be groundwater dependent.
Issues 180m south-west of Cryfield Grange Map WR-02-018 (E5)	410m north-east of the route	Sandstone of the Kenilworth Sandstone Formation overlain by alluvium	72mAOD	May receive groundwater from Kenilworth Sandstone Formation, Principal aquifer.
Issues near Crackley Farm Map WR-02-018 (E6), 700m south-west of Canley Brook viaduct	680m south-west of the route	Sandstone of the Kenilworth Sandstone Formation	85mAOD	May receive groundwater from Kenilworth Sandstone Formation, Principal aquifer.
Canley Brook near Crackley Map EC-01-048 (B7)	Will be crossed by the route	Also a water dependent habitat. Refer to Table 7 for further information.		
Stream Map WR-02-018 (E6), 320m north-west of Canley Brook viaduct	Will be crossed by the route	Sandstone of the Kenilworth Sandstone Formation overlain by alluvium	Not applicable	May receive baseflow from the Principal aquifer or the overlying Secondary A aquifer.

Location description and map reference ¹³	Distance from route	Formation	Elevation	Comments
Issues near Crackley Wood Map WR-02-018 (E6), 640m west of Canley Brook viaduct	250m south-west of the route	Sandstone of the Kenilworth Sandstone Formation	85mAOD	May receive groundwater from Kenilworth Sandstone Formation, Principal aquifer.
Issues near Hollis Lane. Map WR-02-018 (E6), 1.25km north of Kenilworth	400m south-west of the route	Sandstone of the Kenilworth Sandstone Formation	90mAOD	Likely to be a culvert and therefore unlikely to be groundwater dependent.
Two ponds near South Hurst Farm Map EC-04-049 (E7), 1.3km north-west of Canley Brook viaduct	Will be crossed by the route	Interbedded argillaceous rocks and subequal/subordinate sandstone of the Tile Hill Mudstone Formation	90mAOD	Unlikely to be groundwater dependent as located on elevated topography. Likely to be surface water and rainfall dependent.
Pond Map EC-04-049 (E8), 120m south of Broadwells Wood	200m south-west of the route	Sandstone of the Kenilworth Sandstone Formation	100mAOD	Potentially groundwater dependent as located on permeable strata within a valley.
Issues, 200m west of Red Lane Farm Map WR-02-018 (D7), 1.8km south-east of Burton Green	1,100m south-west of the route	Sandstone of the Kenilworth Sandstone Formation overlain by alluvium	90mAOD	May receive groundwater from Principal aquifer or from the Secondary A aquifer.
Stream at Broadwells Wood Map WR-02-018 (D6), 1.3km south-east of Burton Green	Will be crossed by the route	Interbedded argillaceous rocks and subequal/subordinate sandstone of the Tile Hill Mudstone Formation	90mAOD	May receive baseflow from Principal aquifer.
Spring at The Pools Map WR-02-018 (D6), 1.2km east of Burton Green	900m north-east of the route	Sandstone of the Tile Hill Mudstone Formation	95mAOD	May receive groundwater from Principal aquifer.
Pond Map EC-04-049 (C6), 840m south-east of Burton Green	150m north-east of the route	Sandstone of the Tile Hill Mudstone Formation	100mAOD	Potentially groundwater dependent as may receive baseflow from Principal aquifer as located within a valley.
Issues at Bockenden Grange Farm Map WR-02-018 (D6), 670m south-east of Burton Green	400m north-east of the route	Sandstone of the Tile Hill Mudstone Formation	100mAOD	May receive groundwater from Principal aquifer.
Issues at Dixons Farm Map WR-02-018 (D5), 1.1km north-east of Burton Green	1,200m north-east of the route	Interbedded argillaceous rocks and subequal/subordinate sandstone of the Tile Hill Mudstone Formation	100mAOD	May receive groundwater from Principal aquifer.
Pond Map EC-04-050b (I6), Burton Green	50m south-west of the route	Interbedded argillaceous rocks and subequal/subordinate sandstone of the Tile Hill Mudstone Formation	125mAOD	Unlikely to be groundwater dependent as located within a disused railway line. Likely to be surface water and rainfall dependent.

Location description and map reference ¹³	Distance from route	Formation	Elevation	Comments
Issues and watercourse near Black Waste Wood Map WR-02-018 (D6), Burton Green	180m south-west, issues will be crossed by the route	Interbedded argillaceous rocks and subequal/subordinate sandstone of the Tile Hill Mudstone Formation	120mAOD	May receive groundwater from Principal aquifer.
Issues Map WR-02-018 (D6), Burton Green	610m south-west of the route	Oadby Member Diamicton overlies Interbedded argillaceous rocks and subequal/subordinate sandstone of the Tile Hill Mudstone Formation	125mAOD	May receive groundwater from principal aquifer or from potential permeable lenses within the diamicton.
Pond Map EC-04-050b (H7), Burton Green	85m south-west of the route	Interbedded argillaceous rocks and subequal/subordinate sandstone of the Tile Hill Mudstone Formation overlain by diamicton of the Oadby Member	130mAOD	Unlikely to be groundwater dependent as situated on unproductive superficial deposits. Likely to be surface water and rainfall dependent.
Pond Map EC-04-050b (G7), 480m north-west of Burton Green	100m south-west of the route	Interbedded argillaceous rocks and subequal/subordinate sandstone of the Tile Hill Mudstone Formation overlain by diamicton of the Oadby Member	127mAOD	Unlikely to be groundwater dependent as situated on unproductive superficial deposits. Likely to be surface water and rainfall dependent.
Pond Map EC-04-050b (G6), 630m north-west of Burton Green	85m south-west of the route	Interbedded argillaceous rocks and subequal/subordinate sandstone of the Tile Hill Mudstone Formation overlain by diamicton of the Oadby Member	127mAOD	Unlikely to be groundwater dependent as situated on unproductive superficial deposits. Likely to be surface water and rainfall dependent.
Issues north of The Neuk Map WR-02-018 (C6), 330m south-east of Catchems Corner	710m south-west of the route	Mudstone of the Mercia Mudstone Group overlain by diamicton of the Oadby Member	125mAOD	May receive groundwater from Secondary B aquifer or from potential permeable lenses within the Unproductive strata.

Water-dependent habitats

- 3.3.10 Table 7 summarises the potential water-dependent habitats within the study area. These have been identified from a review of Ordnance Survey (OS) mapping, aerial photography and from the following sources:
- information on designated and potential non-statutory Local Wildlife Sites (LWS) from Warwickshire Biological Records Centre;
 - information on statutory designated sites from Natural England; and
 - information from ecological surveys carried out in support of the Environmental Impact Assessment (EIA).
- 3.3.11 The table identifies where a water-dependency may exist but the assessment of impact on water-dependent ecology receptors is found in Volume 2, CFA Report 18, Section 7.

Table 7: Description of water dependent habitats

Location and map reference ¹⁴	Distance from route	Designation	Comments
<p>Waverley and Weston Wood</p> <p>Adjacent to A445 Leicester Lane, 1.7km east of Stareton</p> <p>Map EC-01-047 (H2)</p>	710m north-east of the route	Ancient woodland and LWS	Potentially groundwater and surface water dependent as on permeable strata with wetland ponds and drain present. Naturally damp.
<p>River Avon and tributaries LWS</p> <p>Within the study area from Cubbington to Stoneleigh</p> <p>Maps EC-01-047 and EC-01-048 (I5), will be crossed by the River Avon viaduct</p>	Will be crossed by the route at River Avon viaduct	LWS	Potentially groundwater and surface water dependent as river lies on permeable superficial and bedrock deposits.
<p>Decoy Spinney</p> <p>Near Stone House Farm, 850m south-west of Stareton</p> <p>Map EC-01-047 (E8)</p>	450m south-west of the route	Ancient woodland	Unlikely to be groundwater or surface water dependent as no water features nearby. Potentially rainfall dependent.
<p>Ticknell Spinney</p> <p>Adjacent to Coventry Road, 850m east of Stareton</p> <p>Map EC-01-047 (G2)</p>	1,050m north-east of the route	Ancient woodland	Unlikely to be groundwater dependent as located on elevated topography with no groundwater features nearby. Potentially surface water dependent as multiple surface water ponds present.
<p>Bericote Wood</p> <p>Adjacent to River Avon and B4113 Stoneleigh Road</p> <p>Map EC-01-047 (D10), 980m south of River Avon viaduct</p>	1,000m south-west of the route	Ancient woodland	Unlikely to be groundwater dependent as no groundwater features nearby. Potentially surface water dependent as adjacent to River Avon.
<p>Motslow Hill Spinney</p> <p>At Motslow Hill, 400m south of Stoneleigh</p> <p>Map EC-01-047 (B4)</p>	460m north-east of the route	Ancient woodland	Unlikely to be groundwater or surface water dependent as no water features nearby. Potentially rainfall dependent.
<p>Glasshouse Spinney and Glasshouse Wood</p> <p>Adjacent to A46 and Grecian Lodges, at eastern edge of Kenilworth</p> <p>Map EC-01-048 (H10), 950m south-west of River Avon viaduct</p>	920m south-west of the route	Ancient woodland and LWS	Unlikely to be groundwater dependent as no groundwater features nearby. Potentially surface water dependent as pond with aquatic vegetation at receptor.
<p>Kings Wood</p> <p>Map EC-01-048 (H3), 655m north of River Avon viaduct</p>	530m north-east of the route	Ancient woodland	Unlikely to be groundwater or surface water dependent as located on elevated topography with no water features nearby. Potentially rainfall dependent.

¹⁴ Map references taken from Volume 5: Map Book – ecology, Maps EC-01-047 to EC-01-050a

Location and map reference ¹⁴	Distance from route	Designation	Comments
Knowle Hill Local Nature Reserve (LNR) Map EC-01-048 (D10) 960m south-west of Finham Brook viaduct	940m south-west of the route	LNR	Unlikely to be groundwater or surface water dependent as located on elevated topography with no water features nearby. Potentially rainfall dependent.
Finham Brook Alongside Dalehouse Lane, near Kenilworth Map EC-01-048 (E6), crossed by Finham Brook viaduct	Will be crossed by the route at Finham Brook viaduct	Identified as wet habitat by Ecology	Potentially groundwater and surface water dependent as watercourse lies on permeable superficial and bedrock deposits.
Canley Brook Near Crackley Map EC-01-048 (B7)	Will be crossed by the route	Identified as wet habitat by Ecology	Potentially groundwater and surface water dependent as watercourse lies on permeable superficial and bedrock deposits.
Kenilworth Common In Crackley Map EC-01-048 (C10), 880m south of Canley Brook viaduct	800m south-west of the route	LNR, LWS	Potentially groundwater and surface water dependent as though at elevated topography it is located on permeable superficial and bedrock deposits with a spring at the receptor feeding into Finham Brook which flows along the southern boundary of the receptor towards the Proposed Scheme.
Wainbody Wood, Stivichall Common, Kenilworth Road Spinney LNR and Wainbody Wood North LWS In Gibbett Hill Map EC-01-048 (B1), 1.5km north-east of Canley Brook viaduct	370m north-east of the route	LNR, LWS and partial Ancient woodland	Potentially groundwater and surface water dependent as located on permeable bedrock with issues at the receptor that feed into a stream which flows along the northern border of the receptor to the east.
Tocil Wood and Brookstray LWS, ancient woodland and Tocil Wood and Meadow LNR Near University of Warwick and Gibbett Hill Road. 780m north-west of Gibbett Hill Map EC-01-049 (H1)	1,300m north-east of the route	LWS, partial LNR and partial Ancient woodland	Potentially groundwater and surface water dependent as located on permeable superficial and bedrock deposits with issues at the receptor which feed into a stream that discharges to Canley Brook, which flows through the receptor towards the route. Wet and dry woodland and marshy grassland.
Crackley Wood Map EC-01-049 (H8), 780m north of Kenilworth	Will be crossed by the route	Ancient woodland, partial LWS and partial LNR	Potentially groundwater and surface water dependent as located on permeable bedrock with partial permeable superficial deposits. There are issues at the receptor which feed into a stream that flows through the receptor before crossing the route and discharging to Canley Brook.
Whitefield Coppice Near Hurst Farm Map EC-01-049 (F3), 1.3km north-west of Canley Brook viaduct	700m north-east of the route	Ancient woodland and LWS	Potentially groundwater and surface water dependent as located on permeable bedrock with partial permeable superficial deposits within a valley. Stream flows through receptor to discharge to a tributary of Canley Brook.

Location and map reference ¹⁴	Distance from route	Designation	Comments
Rough Knowles Wood Map EC-01-049 (F5), 1.2km north-west of Canley Brook viaduct	100m north-east of the route	Ancient woodland	Unlikely to be groundwater or surface water dependent as located on elevated topography with no water features nearby. Likely to be rainfall dependent.
Broadwells Wood Map EC-01-049 (D5), 1.1km south-east of Burton Green green tunnel	Will be crossed by the route	LWS and partial Ancient woodland	Potentially groundwater and surface water dependent as located on permeable bedrock with stream flowing through the receptor that is fed by nearby issues.
Long Meadow Wood Map EC-01-049 (C10), 1.1km south-east of Burton Green green tunnel	760m south-west of the route	Ancient woodland	Unlikely to be groundwater or surface water dependent as no water features nearby. Potentially rainfall dependent.
The Pools Wood Map EC-01-049 (C3), 1.1km east of Burton Green green tunnel	730m north-east of the route	LWS	Potentially groundwater and surface water dependent as located on permeable bedrock with a spring in the receptor that feeds to a stream which flows through the receptor, away from the route.
Stoneymoor Wood Map EC-01-049 (A10), 530m south-west of Burton Green green tunnel	720m south-west of the route	Ancient woodland	Unlikely to be groundwater or surface water dependent as partially located on Unproductive strata with no water features nearby. Potentially rainfall dependent.
Black Waste Wood Map EC-01-050a (I5), 60m east of Burton Green green tunnel	Will be crossed by the route	Ancient woodland and LWS	Potentially groundwater and surface water dependent as located on permeable bedrock with issues on the opposite side of route which feed to a stream that flows along the southern boundary of the receptor.
Big Pools and Little Pools Wood Map EC-01-050a (H7), 340m south-west of Burton Green green tunnel	10m south-west of the route	LWS	Potentially groundwater dependent as located on permeable bedrock; however, unproductive superficial deposits are present. There are issues at Big Pools Wood, indicating that groundwater levels are near surface at the receptor.
Beanit Farm Hedge Map EC-01-050a (F7), 730m north-west of Burton Green green tunnel	90m south-west of the route	LWS	Unlikely to be groundwater dependent as located on unproductive superficial deposits. Likely to be surface water and rainfall dependent.
Little Beanit Farm Meadow Map EC-01-050a (E8), 640m north-west of Burton Green green tunnel	350m south-west of the route	LWS	Unlikely to be groundwater dependent as located on unproductive superficial deposits. Likely to be surface water and rainfall dependent.

4 **Site-specific assessments**

4.1 **Surface water**

4.1.1 Table 8 summarises the potential impacts and effects to surface water.

Table 8: Summary of potential impacts to surface water

Surface water feature/receptor ¹⁵	Value of surface water feature ¹⁶	Design element	Magnitude of impact (no mitigation)	Potential impact to water resource	Avoidance and mitigation measures	Magnitude of remaining impact and effect	Other mitigation measures	Residual effect	Duration of effect
Tributary of River Avon at Cotton Mill Spinney (watercourse does not intersect route) 280m north-east of the route Map WR-01-030 (H6)	Moderate	Realigned A445 Leicester Lane Drainage outfall (for highways drainage) Balancing pond (for highways drainage)	Moderate adverse	Deterioration of water quality due to: Deposition of soils, sediment and other construction materials, and spillage of fuels and other hazardous liquids; The mobilisation of contaminants following disturbance of contaminated ground or groundwater; Uncontrolled site run-off.	Adoption of Environment Agency Pollution Prevention Guidelines (PPGs) – particularly PPG5 for in-channel works. Mitigation measures outlined in draft CoCP. Water management measures implemented during earthworks operation. Temporary site drainage designed to retain surface run-off within site boundary. Grey water systems used at construction compounds.	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	Construction (Temporary)

¹⁵ Map references taken from Volume 5: Map Book – water resources, Maps WR-01-030 and WR-01-031

¹⁶ For examples of receptor value see Table 43 in the SMR addendum Volume 5 Appendix CT-001-000/2.

Surface water feature/receptor ¹⁵	Value of surface water feature ¹⁶	Design element	Magnitude of impact (no mitigation)	Potential impact to water resource	Avoidance and mitigation measures	Magnitude of remaining impact and effect	Other mitigation measures	Residual effect	Duration of effect
		Drainage outfall (from road)	Moderate adverse	<p>Impact on flows in the receiving watercourse.</p> <p>Deterioration of water quality due to contamination of surface water from either routine discharges from the road or accidental spillages.</p> <p>Initial Highway Agency Water Risk Assessment Tool (HAWRAT)¹⁷ results show that mitigation would be required to offset the potential impacts to the water environment (particularly to address dissolved copper concentrations and the dispersal of sediments).</p>	<p>Drainage has been designed to reduce the rate and volume of run-off from the road and to provide temporary storage for potential spillages.</p> <p>Balancing pond before outfall to watercourse to restrict run-off rates and reduce the effect on water quality by reducing potential contaminants through filtration, vegetative absorption or settlement.</p>	<p>Negligible</p> <p>Neutral</p> <p>(not significant)</p>	None required	<p>Negligible</p> <p>Neutral</p> <p>(not significant)</p>	Construction (Permanent)
		All elements (maintenance)	Moderate adverse	Deterioration of water quality due to contamination from de-icing substances used during cold weather and herbicides for managing vegetation.	Best practice pollution control guidance will be adopted for maintenance of the Proposed Scheme.	<p>Negligible</p> <p>Neutral</p> <p>(not significant)</p>	None required	<p>Negligible</p> <p>Neutral</p> <p>(not significant)</p>	Operation

¹⁷ DMRB, 2009. Volume 11 Section 3 Part 10 HD45/09 Road Drainage and the Water Environment

Surface water feature/ receptor ¹⁵	Value of surface water feature ¹⁶	Design element	Magnitude of impact (no mitigation)	Potential impact to water resource	Avoidance and mitigation measures	Magnitude of remaining impact and effect	Other mitigation measures	Residual effect	Duration of effect
<p>Tributary of River Avon at Leicester Lane (watercourse does not intersect route)</p> <p>410m north-east of the route</p> <p>Map WR-01-030 (H5)</p>	Moderate	<p>Realigned A445 Leicester Lane</p> <p>Drainage outfalls</p> <p>Balancing ponds</p>	Moderate adverse	<p>Deterioration of water quality due to:</p> <p>Deposition of soils, sediment and other construction materials, and spillage of fuels and other hazardous liquids;</p> <p>The mobilisation of contaminants following disturbance of contaminated ground or groundwater;</p> <p>Uncontrolled site run-off.</p>	<p>Adoption of Environment Agency PPGs – particularly PPG5 for in-channel works.</p> <p>Mitigation measures outlined in draft CoCP.</p> <p>Water management implemented during earthworks operation.</p> <p>Temporary site drainage designed to retain surface run-off within site boundary.</p> <p>Grey water systems used at construction compounds.</p>	<p>Negligible</p> <p>Neutral</p> <p>(not significant)</p>	None required	<p>Negligible</p> <p>Neutral</p> <p>(not significant)</p>	Construction (Temporary)

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Surface water feature/receptor ¹⁵	Value of surface water feature ¹⁶	Design element	Magnitude of impact (no mitigation)	Potential impact to water resource	Avoidance and mitigation measures	Magnitude of remaining impact and effect	Other mitigation measures	Residual effect	Duration of effect
		Drainage outfall (from railway)	Moderate adverse	<p>Impact on flows in the receiving watercourse.</p> <p>Deterioration of water quality due to contamination of surface water from both routine discharges from the proposed railway and associated infrastructure or from accidental spillages.</p>	<p>Drainage has been designed to reduce the rate and volume of run-off from the proposed railway and to provide temporary storage for potential spillages.</p> <p>Balancing pond before outfall to watercourse to restrict run-off rates and reduce the effect on water quality by reducing potential contaminants through filtration, vegetative absorption or settlement.</p>	<p>Negligible</p> <p>Neutral</p> <p>(not significant)</p>	None required	<p>Negligible</p> <p>Neutral</p> <p>(not significant)</p>	Construction (Permanent)

Surface water feature/receptor ¹⁵	Value of surface water feature ¹⁶	Design element	Magnitude of impact (no mitigation)	Potential impact to water resource	Avoidance and mitigation measures	Magnitude of remaining impact and effect	Other mitigation measures	Residual effect	Duration of effect
		Drainage outfall (from realigned A445 Leicester Lane Drainage assumed to join tributary of River Avon at Leicester Lane)	Moderate adverse	<p>Impact on flows in the receiving watercourse.</p> <p>Deterioration of water quality due to contamination of surface water from both routine discharges from the road and associated infrastructure or from accidental spillages.</p> <p>Initial HAWRAT result show that mitigation would be required to offset the potential impacts to the water environment (particularly to address dissolved copper concentrations and the dispersal of sediments).</p>	<p>Drainage has been designed to reduce the rate and volume of run-off from the road and to provide temporary storage for potential spillages.</p> <p>Balancing pond before outfall to watercourse to restrict run-off rates and reduce the effect on water quality by reducing potential contaminants through filtration, vegetative absorption or settlement.</p>	<p>Negligible</p> <p>Neutral</p> <p>(not significant)</p>	None required	<p>Negligible</p> <p>Neutral</p> <p>(not significant)</p>	Construction (Permanent)
		All elements (maintenance)	Moderate adverse	Deterioration of water quality due to contamination from de-icing substances used during cold weather and herbicides for managing vegetation.	Best practice pollution control guidance will be adopted for maintenance of the Proposed Scheme.	<p>Negligible</p> <p>Neutral</p> <p>(not significant)</p>	None required	<p>Negligible</p> <p>Neutral</p> <p>(not significant)</p>	Operation

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Surface water feature/ receptor ¹⁵	Value of surface water feature ¹⁶	Design element	Magnitude of impact (no mitigation)	Potential impact to water resource	Avoidance and mitigation measures	Magnitude of remaining impact and effect	Other mitigation measures	Residual effect	Duration of effect
<p>Tributary of the River Avon at Hares Parlour (watercourse does not intersect route)</p> <p>295m south-west of the route</p> <p>Map WR-01-030 (F6)</p>	Moderate	<p>Realignment of B4113 Stoneleigh Road</p> <p>Drainage outfall</p> <p>Balancing pond</p>	Moderate adverse	<p>Deterioration of water quality due to:</p> <p>Deposition of soils, sediment and other construction materials, and spillage of fuels and other hazardous liquids;</p> <p>The mobilisation of contaminants following disturbance of contaminated ground or groundwater;</p> <p>Uncontrolled site run-off.</p>	<p>Adoption of Environment Agency PPGs – particularly PPG5 for in-channel works.</p> <p>Mitigation measures outlined in draft CoCP.</p> <p>Water management implemented during earthworks operation.</p> <p>Temporary site drainage designed to retain surface run-off within site boundary.</p> <p>Grey water systems used at construction compounds.</p>	<p>Negligible</p> <p>Neutral</p> <p>(not significant)</p>	None required	<p>Negligible</p> <p>Neutral</p> <p>(not significant)</p>	Construction (Temporary)

Surface water feature/receptor ¹⁵	Value of surface water feature ¹⁶	Design element	Magnitude of impact (no mitigation)	Potential impact to water resource	Avoidance and mitigation measures	Magnitude of remaining impact and effect	Other mitigation measures	Residual effect	Duration of effect
		Drainage outfall (from realignment of B4113 Stoneleigh Road, assumed to join tributary of the River Avon)	Moderate adverse	Impact on flows in the receiving watercourse. Deterioration of water quality due to contamination of surface water from either routine discharge from the road and associated infrastructure or from accidental spillages.	Drainage has been designed to reduce the rate and volume of run-off from the road and to provide temporary storage for potential spillages. Balancing pond before outfall to watercourse to restrict run-off rates and reduce the effect on water quality by reducing potential contaminants through filtration, vegetative absorption or settlement.	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	Construction (Permanent)
		All elements (maintenance)	Moderate adverse	Deterioration of water quality due to contamination from de-icing substances used during cold weather and herbicides for managing vegetation.	Best practice pollution control guidance will be adopted for maintenance of the Proposed Scheme.	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	Operation

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Surface water feature/ receptor ¹⁵	Value of surface water feature ¹⁶	Design element	Magnitude of impact (no mitigation)	Potential impact to water resource	Avoidance and mitigation measures	Magnitude of remaining impact and effect	Other mitigation measures	Residual effect	Duration of effect
<p>River Avon at Sowe Mouth (watercourse does not intersect route)</p> <p>70m north-east of the route</p> <p>Map WR-01-030 (E5)</p>	High	<p>Realignment of B4113 Stoneleigh Road</p> <p>Realignment of Stareton Road</p> <p>Drainage outfalls</p> <p>Balancing pond</p> <p>Stoneleigh Park retaining wall</p>	Moderate adverse	<p>Deterioration of water quality due to:</p> <p>Deposition of soils, sediment and other construction materials, and spillage of fuels and other hazardous liquids;</p> <p>The mobilisation of contaminants following disturbance of contaminated ground or groundwater;</p> <p>Uncontrolled site run-off.</p>	<p>Adoption of Environment Agency PPGs – particularly PPG5 for in-channel works.</p> <p>Mitigation measures outlined in draft CoCP.</p> <p>Water management implemented during earthworks operation.</p> <p>Temporary site drainage designed to retain surface run-off within site boundary.</p> <p>Grey water systems used at construction compounds.</p>	<p>Negligible</p> <p>Neutral</p> <p>(not significant)</p>	None required	<p>Negligible</p> <p>Neutral</p> <p>(not significant)</p>	Construction (Temporary)

Surface water feature/receptor ¹⁵	Value of surface water feature ¹⁶	Design element	Magnitude of impact (no mitigation)	Potential impact to water resource	Avoidance and mitigation measures	Magnitude of remaining impact and effect	Other mitigation measures	Residual effect	Duration of effect
		Drainage outfall (from realignment of B4113 Stoneleigh Road and realignment of Stareton Road Drainage assumed to join River Avon at Sowe Mouth)	Moderate adverse	Impact on flows in the receiving watercourse. Deterioration of water quality due to contamination of surface water from either routine discharge from the road and associated infrastructure or from accidental spillages.	Drainage has been designed to reduce the rate and volume of run-off from the road and to provide temporary storage for potential spillages. Balancing pond before outfall to watercourse to restrict run-off rates and reduce the effect on water quality by reducing potential contaminants through filtration, vegetative absorption or settlement.	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	Construction (Permanent)

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Surface water feature/receptor ¹⁵	Value of surface water feature ¹⁶	Design element	Magnitude of impact (no mitigation)	Potential impact to water resource	Avoidance and mitigation measures	Magnitude of remaining impact and effect	Other mitigation measures	Residual effect	Duration of effect
		Drainage outfall (from railway)	Moderate adverse	Impact on flows in the receiving watercourse. Deterioration of water quality due to contamination of surface water from either routine discharge from the proposed railway and associated infrastructure or from accidental spillages.	Drainage has been designed to reduce the rate and volume of run-off from the proposed railway and to provide temporary storage for potential spillages. Balancing pond before outfall to watercourse to restrict run-off rates and reduce the effect on water quality by reducing potential contaminants through filtration, vegetative absorption or settlement.	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	Construction (Permanent)
		All elements (maintenance)	Moderate adverse	Deterioration of water quality due to contamination from de-icing substances used during cold weather and herbicides for managing vegetation.	Best practice pollution control guidance will be adopted for maintenance of the Proposed Scheme.	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	Operation

Surface water feature/ receptor ¹⁵	Value of surface water feature ¹⁶	Design element	Magnitude of impact (no mitigation)	Potential impact to water resource	Avoidance and mitigation measures	Magnitude of remaining impact and effect	Other mitigation measures	Residual effect	Duration of effect
River Avon at Sowe Mouth Plantation (SWC-CFA18-001) Map WR-01-030 (E5)	High	River Avon viaduct Embankment Drainage outfalls Balancing pond Realigned B4115 Ashow Road	Moderate adverse	Deterioration of water quality due to: Deposition or spillage of soils, sediment, fuels or other construction materials; The mobilisation of contamination following disturbance of contaminated ground or groundwater; Uncontrolled site run-off.	Adoption of Environment Agency PPGs – particularly PPG5 for in-channel works. Mitigation measures outlined in draft CoCP. Water management implemented during earthworks operation. Temporary site drainage designed to retain surface run-off within site boundary. Grey water systems used at construction compounds.	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	Construction (Temporary)

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Surface water feature/ receptor ¹⁵	Value of surface water feature ¹⁶	Design element	Magnitude of impact (no mitigation)	Potential impact to water resource	Avoidance and mitigation measures	Magnitude of remaining impact and effect	Other mitigation measures	Residual effect	Duration of effect
		Drainage outfall (from railway)	Moderate adverse	Impact on flows in the receiving watercourse. Deterioration of water quality due to contamination of surface water from either routine discharge from the proposed railway and associated infrastructure or from accidental spillages.	Drainage has been designed to reduce the rate and volume of run-off from the proposed railway and to provide temporary storage for potential spillages. Balancing pond before outfall to watercourse to restrict run-off rates and reduce the effect on water quality by reducing potential contaminants through filtration, vegetative absorption or settlement.	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	Construction (Permanent)
		Drainage outfall (from realigned B4115 Ashow Road Drainage assumed to join River Avon at Sowe Mouth Plantation)	Moderate adverse	Impact on flows in the receiving watercourse. Deterioration of water quality due to contamination of surface water from either routine discharge from the road and associated infrastructure or from accidental spillages.	Drainage has been designed to reduce the rate and volume of run-off from the road and to provide temporary storage for potential spillages.	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	Construction (Permanent)
		All elements (maintenance)	Moderate adverse	Deterioration of water quality due to contamination from de-icing substances used during cold weather and herbicides for managing vegetation.	Best practice pollution control guidance will be adopted for maintenance of the Proposed Scheme.	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	Operation

Surface water feature/receptor ¹⁵	Value of surface water feature ¹⁶	Design element	Magnitude of impact (no mitigation)	Potential impact to water resource	Avoidance and mitigation measures	Magnitude of remaining impact and effect	Other mitigation measures	Residual effect	Duration of effect
Finham Brook at Dalehouse Farm (SWC-CFA18-002) Map WR-01-030 (C5)	Very High	Finham Brook viaduct Dalehouse Lane overbridge Earthworks Embankment	Moderate adverse	Deterioration of water quality due to: Deposition of soils, sediment and other construction materials, and spillage of fuels and other hazardous liquids; The mobilisation of contaminants following disturbance of contaminated ground or groundwater; Uncontrolled site run-off.	Adoption of Environment Agency PPGs – particularly PPG5 for in-channel works. Mitigation measures outlined in draft CoCP. Water management implemented during earthworks operation. Temporary site drainage designed to retain surface run-off within site boundary. Grey water systems used at construction compounds.	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	Construction (Temporary)

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Surface water feature/ receptor ¹⁵	Value of surface water feature ¹⁶	Design element	Magnitude of impact (no mitigation)	Potential impact to water resource	Avoidance and mitigation measures	Magnitude of remaining impact and effect	Other mitigation measures	Residual effect	Duration of effect
Canley Brook upstream of Crackley Bridge (SWC-CFA18-003) Map WR-01-031 (H5)	High	Realigned A429 Kenilworth Road Embankments Drainage outfalls Balancing ponds Realigned and regraded Canley Brook channel Canley Brook retaining wall Canley Brook viaduct Earthworks	Moderate adverse	Deterioration of water quality due to: Deposition of soils, sediment and other construction materials, and spillage of fuels and other hazardous liquids; The mobilisation of contaminants following disturbance of contaminated ground or groundwater; Uncontrolled site run-off. In-channel construction work has the potential to have a moderate impact on the existing water environment, flows and the ecology supported, through the disturbance of silt or the direct contamination by polluting materials.	Adoption of Environment Agency PPGs – particularly PPG5 for in-channel works. Mitigation measures outlined in draft CoCP. Water management implemented during earthworks operation. Temporary site drainage designed to retain surface run-off within site boundary. Grey water systems used at construction compounds.	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	Construction (Temporary)

Surface water feature/ receptor ¹⁵	Value of surface water feature ¹⁶	Design element	Magnitude of impact (no mitigation)	Potential impact to water resource	Avoidance and mitigation measures	Magnitude of remaining impact and effect	Other mitigation measures	Residual effect	Duration of effect
		Drainage outfall (from railway)	Moderate adverse	Impact on flows in the receiving watercourse. Deterioration of water quality due to contamination of surface water from both routine discharges from the proposed railway and associated infrastructure or from accidental spillages.	Drainage has been designed to reduce the rate and volume of run-off from the proposed railway and to provide temporary storage for potential spillages. Balancing pond before outfall to watercourse to restrict run-off rates and reduce the effect on water quality by reducing potential contaminants through filtration, vegetative absorption or settlement.	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	Construction (Permanent)

Surface water feature/ receptor ¹⁵	Value of surface water feature ¹⁶	Design element	Magnitude of impact (no mitigation)	Potential impact to water resource	Avoidance and mitigation measures	Magnitude of remaining impact and effect	Other mitigation measures	Residual effect	Duration of effect
		Drainage outfall (from realigned A429 Kenilworth Road Drainage assumed to join Canley Brook upstream of Crackley Bridge)	Moderate adverse	Impact on flows in the receiving watercourse. Deterioration of water quality due to contamination of surface water from either routine discharge from the road and associated infrastructure or from accidental spillages. Initial HAWRAT result show that mitigation would be required to offset the potential impacts to the water environment (particularly to address the dispersal of sediments).	Drainage has been designed to reduce the rate and volume of run-off from the road and to provide temporary storage for potential spillages.	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	Construction (Permanent)
		Diverted and regraded Canley Brook channel	Moderate adverse	Deterioration or loss of the existing water environment, flows and the ecology supported.	Opportunities will be taken to retain and if possible enhance the overall quality of the watercourses, for example by including meanders and enhanced banks.	Minor to Minor Beneficial Slight to Slight Beneficial (not significant)	None required	Minor to Minor Beneficial Slight to Slight Beneficial (not significant)	Construction (Permanent)
		All elements (maintenance)	Moderate adverse	Deterioration of water quality due to contamination from de-icing substances used during cold weather and herbicides for managing vegetation.	Best practice pollution control guidance will be adopted for maintenance of the Proposed Scheme.	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	Operation

Surface water feature/ receptor ¹⁵	Value of surface water feature ¹⁶	Design element	Magnitude of impact (no mitigation)	Potential impact to water resource	Avoidance and mitigation measures	Magnitude of remaining impact and effect	Other mitigation measures	Residual effect	Duration of effect
Tributary of Canley Brook crossing at Birches Wood Farm (SWC-CFA18-004) Map WR-01-031 (G5)	Moderate	Diverted Bridleway W164 Diverted Bridleway W165x Crackley Wood Culvert Regraded / realigned watercourse Embankment Drainage outfall Balancing Pond	Moderate adverse	Deterioration of water quality due to: Deposition of soils, sediment and other construction materials, and spillage of fuels and other hazardous liquids; The mobilisation of contaminants following disturbance of contaminated ground or groundwater; Uncontrolled site run-off.	Adoption of Environment Agency PPGs – particularly PPG5 for in-channel works. Mitigation measures outlined in draft CoCP. Water management implemented during earthworks operation. Temporary site drainage designed to retain surface run-off within site boundary. Grey water systems used at construction compounds.	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	Construction (Temporary)
		Regraded / realigned watercourse	Moderate adverse	Watercourse realignment/re-grading may impact on the existing water environment, potentially changing flow characteristics and the ecology supported.	Opportunities will be taken to retain and if possible enhance the overall quality of the watercourses, for example by including meanders and enhanced banks.	Minor to Minor Beneficial Slight to Slight Beneficial (not significant)	None required	Minor to Minor Beneficial Slight to Slight Beneficial (not significant)	Construction (Permanent)

Surface water feature/receptor ¹⁵	Value of surface water feature ¹⁶	Design element	Magnitude of impact (no mitigation)	Potential impact to water resource	Avoidance and mitigation measures	Magnitude of remaining impact and effect	Other mitigation measures	Residual effect	Duration of effect
		Crackley Wood Culvert	Moderate adverse	Culvert may impact on the existing water environment, potentially changing flow characteristics and the ecology supported.	Improvements along watercourse either side of culvert, to mitigate loss of open length.	Minor to Minor Beneficial Slight to Slight Beneficial (not significant)	None required	Minor to Minor Beneficial Slight to Slight Beneficial (not significant)	Construction (Permanent)
		Drainage outfall (from railway)	Moderate adverse	Impact on flows in the receiving watercourse. Deterioration of water quality due to contamination of surface water from either routine discharge from the proposed railway and associated infrastructure or from accidental spillages.	Drainage has been designed to reduce the rate and volume of run-off from the proposed railway and to provide temporary storage for potential spillages. Balancing pond before outfall to watercourse to restrict run-off rates and reduce the effect on water quality by reducing potential contaminants through filtration, vegetative absorption or settlement.	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	Construction (Permanent)
		All elements (maintenance)	Moderate adverse	Deterioration of water quality due to contamination from de-icing substances used during cold weather and herbicides for managing vegetation.	Best practice pollution control guidance will be adopted for maintenance of the Proposed Scheme.	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	Operation

Surface water feature/receptor ¹⁵	Value of surface water feature ¹⁶	Design element	Magnitude of impact (no mitigation)	Potential impact to water resource	Avoidance and mitigation measures	Magnitude of remaining impact and effect	Other mitigation measures	Residual effect	Duration of effect
Pond south of South Hurst Farm (SWC-CFA18-005) Map WR-01-031 (F5)	Refer to ecology Volume 2, CFA Report 18, Section 7 for impacts assessment								
Tributary of Canley Brook crossing at Broadwells Wood (SWC-CFA18-006) Map WR-01-031 (E6)	Moderate	Drainage outfall Balancing pond Broadwells Wood Culvert Footpath W168 realignment	Moderate adverse	Deterioration of water quality due to: Deposition of soils, sediment and other construction materials, and spillage of fuels and other hazardous liquids; The mobilisation of contaminants following disturbance of contaminated ground or groundwater; Uncontrolled site run-off. In-channel construction work has the potential to have a moderate impact on the existing water environment, flows and the ecology supported, through the disturbance of silt or the direct contamination by polluting materials.	Adoption of Environment Agency PPGs – particularly PPG5 for in-channel works. Mitigation measures outlined in draft CoCP. Water management implemented during earthworks operation. Temporary site drainage designed to retain surface run-off within site boundary. Grey water systems used at construction compounds.	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	Construction (Temporary)

Surface water feature/receptor ¹⁵	Value of surface water feature ¹⁶	Design element	Magnitude of impact (no mitigation)	Potential impact to water resource	Avoidance and mitigation measures	Magnitude of remaining impact and effect	Other mitigation measures	Residual effect	Duration of effect
		Broadwells Wood Culvert	Moderate adverse	Culvert may impact on the existing water environment, potentially changing flow characteristics and the ecology supported.	Improvements along watercourse either side of culvert, to mitigate loss of open length.	Minor to Minor Beneficial Slight to Slight Beneficial (not significant)	None required	Minor to Minor Beneficial Slight to Slight Beneficial (not significant)	Construction (Permanent)
		Drainage outfall (from railway)	Moderate adverse	Impact on flows in the receiving watercourse. Deterioration of water quality due to contamination of surface water from both routine discharges from the proposed railway and associated infrastructure or from accidental spillages.	Drainage has been designed to reduce the rate and volume of run-off from the proposed railway and to provide temporary storage for potential spillages. Balancing pond before outfall to watercourse to restrict run-off rates and reduce the effect on water quality by reducing potential contaminants through filtration, vegetative absorption or settlement.	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	Construction (Permanent)
		All elements (maintenance)	Moderate adverse	Deterioration of water quality due to contamination from de-icing substances used during cold weather and herbicides for managing vegetation.	Best practice pollution control guidance will be adopted for maintenance of the Proposed Scheme.	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	Operation

Surface water feature/ receptor ¹⁵	Value of surface water feature ¹⁶	Design element	Magnitude of impact (no mitigation)	Potential impact to water resource	Avoidance and mitigation measures	Magnitude of remaining impact and effect	Other mitigation measures	Residual effect	Duration of effect
Tributary of Canley Brook at Burton Green / Black Waste Wood (SWC-CFA18-007) Map WR-01-031 (D6)	Moderate	Burton Green green tunnel south porous portal Realigned watercourse Black Waste Wood culvert	Moderate adverse	Deterioration of water quality due to: Deposition of soils, sediment and other construction materials, and spillage of fuels and other hazardous liquids; The mobilisation of contaminants following disturbance of contaminated ground or groundwater; Uncontrolled site run-off. In-channel construction work has the potential to have a moderate impact on the existing water environment, flows and the ecology supported, through the disturbance of silt or the direct contamination by polluting materials.	Adoption of Environment Agency PPGs – particularly PPG5 for in-channel works. Mitigation measures outlined in draft CoCP. Water management implemented during earthworks operation. Temporary site drainage designed to retain surface run-off within site boundary. Grey water systems used at construction compounds.	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	Construction (Temporary)
		Realigned watercourse	Moderate adverse	Watercourse realignment/re-grading and culvert may impact on the existing water environment, potentially changing flow characteristics and the ecology supported.	Opportunities will be taken to retain and if possible enhance the overall quality of the watercourses, for example by including meanders and enhanced banks.	Minor to Minor Beneficial Slight to Slight Beneficial (not significant)	None required	Minor to Minor Beneficial Slight to Slight Beneficial (not significant)	Construction (Permanent)

Surface water feature/ receptor ¹⁵	Value of surface water feature ¹⁶	Design element	Magnitude of impact (no mitigation)	Potential impact to water resource	Avoidance and mitigation measures	Magnitude of remaining impact and effect	Other mitigation measures	Residual effect	Duration of effect
		Black Waste Wood culvert	Moderate adverse	Culvert may impact on the existing water environment, potentially changing flow characteristics and the ecology supported.	Improvements along watercourse either side of culvert, to mitigate loss of open length.	Minor to Minor Beneficial Slight to Slight Beneficial (not significant)	None required	Minor to Minor Beneficial Slight to Slight Beneficial (not significant)	Construction (Permanent)

4.2 Groundwater

4.2.1 Following the methodology outlined in the SMR addendum (see Volume 5: Appendix CT-001-000/2), the hydraulic conductivity values; obtained from available literature values, were used in conjunction with professional judgment to estimate the maximum extent of the zone of influence that is likely to be produced when dewatering of a cutting occurs. The hydraulic conductivity values used are generally in the high range of literature values to provide a realistic factor of safety to the estimated zone of influence. Based on this worst case assumption, the zone of influence is likely to be overestimated; however, for the purpose of this preliminary assessment, this approach is considered to be acceptable.

4.2.2 Aquifer properties used for estimating the zone of influence can be found in Table 9.

Table 9: Aquifer properties

Lithology	Maximum hydraulic conductivity value used in calculations	References
Bromsgrove Sandstone Formation	2.71m/d	BGS (1997) Major Aquifers Properties Manual ¹⁸
Kenilworth Sandstone Formation	3m/d	BGS (1997) Major Aquifers Properties Manual
Tile Hill Mudstone	3m/d	BGS (1997) Major Aquifers Properties Manual
River Terrace Deposits	51.8m/d	An average of sand values from Domenico and Schwartz (1990) ¹⁹
Oadby Till	0.173m/d	Domenico and Schwartz (1990)

4.2.3 The zone of influence for the dewatering of the cuttings along the route was calculated at frequent intervals as topography, geology and track level change, using the methodology outlined in the SMR addendum (see Volume 5: Appendix CT-001-000/2) and the properties in Table 9. Table 10 summarises the estimated zone of influence within the study area for each of the cuttings. In each case, the maximum zone of influence value reported has not been applied to the whole extent of the cutting; it is purely illustrative of the worst-case conditions at its deepest section.

Table 10: Maximum extent of zone of influence in CFA18

Cutting	Geology	Maximum drawdown within cutting	Maximum zone of influence estimated from maximum drawdown	Comments
Cublington cutting	Bromsgrove Sandstone Formation	3m	50m	
Stonehouse cutting	Kenilworth Sandstone Formation overlain by Bromsgrove Sandstone Formation	7m	130m	Bulk hydraulic conductivity value calculated and applied across the depth of the cutting.

¹⁸ British Geological Survey (1997), *The Physical Properties of Major Aquifers in England and Wales*.

¹⁹ Domenico, P.A. and F.W. Schwartz, (1990). *Physical and Chemical Hydrogeology*, John Wiley & Sons, New York.

Cutting	Geology	Maximum drawdown within cutting	Maximum zone of influence estimated from maximum drawdown	Comments
Stoneleigh Park retaining wall – zone of influence applicable during temporary construction phase only	Kenilworth Sandstone Formation overlain by Bromsgrove Sandstone Formation	10m	174m	Bulk hydraulic conductivity value calculated and applied across the depth of the cutting.
	Kenilworth Sandstone Formation	8m	142m	
Glasshouse Wood cutting	Kenilworth Sandstone Formation	14m	248m	
Kenilworth cutting	Kenilworth Sandstone Formation	7m	124m	
	River Terrace Deposits	4m	294m	Spatially limited to the extent of the superficial deposit.
Canley Brook retaining wall – zone of influence applicable during temporary construction phase only	Kenilworth Sandstone Formation	11m	194m	
Crackley Road cutting	Kenilworth Sandstone Formation	8m	141m	
Canley Brook viaduct	Kenilworth Sandstone Formation	7m	124m	
North Crackley cutting	Kenilworth Sandstone Formation	5m	88m	
Roughknowles Wood cutting	Kenilworth Sandstone Formation	12m	212m	
Bockenden cutting	Interbedded Argillaceous Rocks of the Tile Hill Mudstone Formation	3m	53m	
Burton Green south cutting	Interbedded Argillaceous Rocks of the Tile Hill Mudstone Formation	2m	35m	
Burton Green green tunnel	Interbedded Argillaceous Rocks of the Tile Hill Mudstone Formation	10m	159m	
	Oadby Till	5m	21m	
Burton Green retaining structure	Oadby Till	5m	21m	
	Interbedded Argillaceous Rocks of the Tile Hill Mudstone Formation	12m	141m	

4.2.4 Table 11 summarises the potential impacts to groundwater, abstractions, water dependent habitats and groundwater/ surface water interactions.

Table 11: Summary of potential impacts to groundwater, abstractions, water dependent habitats and groundwater/ surface water interactions

Groundwater receptor ²⁰ (and value ²¹)	Design element	Magnitude of impact (no mitigation)	Potential impact to groundwater	Avoidance and mitigation measures	Magnitude of remaining impact and effect	Other mitigation measures	Residual effect	Duration of effect
Aquifers								
Principal bedrock aquifer: Bromsgrove Sandstone Formation, Kenilworth Sandstone Group, Ashow Formation and the Tile Hill Mudstone Formation (high)	<p>Cuttings:</p> <p>Cubbington; Stonehouse; Glasshouse Wood; Kenilworth; Crackley Road; Canley Brook viaduct (cutting due to brook diversion); North Crackley; Roughknowles Wood; Bockenden; Burton Green South; Burton Green green tunnel; Burton Green retaining structure;</p> <p>Auto-transformer station;</p> <p>Road realignments; embankments; stockpiles; worksites and construction compounds;</p> <p>Construction traffic routes; and</p> <p>Foundations for viaducts and bridges.</p>	Moderate adverse	<p>Dewatering may reduce the groundwater levels within the aquifer.</p> <p>Potential for contaminants to enter groundwater during construction (e.g. suspended solids, leaks from machinery).</p> <p>Reduced infiltration could locally reduce groundwater levels; however, this is likely to be minimal and temporary.</p> <p>Foundations required for viaducts have potential to alter groundwater flow regime; however, any change is likely to be localised and minimal.</p>	<p>Sustainable drainage systems (SuDS) such as infiltration trenches will be located where gravity transfer is feasible to facilitate groundwater recharge.</p> <p>Contamination control measures as required by the draft CoCP Section 16.</p>	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	Construction (Permanent)

²⁰ Map references taken from Volume 5: Map Book – water resources, Map WR-02-018 and Volume 5: Map Book – ecology, Maps EC-01 to EC-04²¹ For examples of receptor value see Table 43 in the SMR addendum Volume 5 Appendix CT-001-000/2.

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Groundwater receptor ²⁰ (and value ²¹)	Design element	Magnitude of impact (no mitigation)	Potential impact to groundwater	Avoidance and mitigation measures	Magnitude of remaining impact and effect	Other mitigation measures	Residual effect	Duration of effect
	Stoneleigh Park retaining wall; and Canley Brook retaining wall.	Moderate adverse	Dewatering may reduce the groundwater levels within the aquifer. Potential for contaminants to enter groundwater during construction (e.g. suspended solids, leaks from machinery).	SuDS such as infiltration trenches will be located where feasible to facilitate groundwater recharge. Mitigation via gravity transfer is not possible at this location; however during the construction of the retaining walls dewatering will be required therefore pumping will be in operation. As a result water can be transferred to SuDS during the construction phase. Contamination control measures as required by the draft CoCP Section 16.	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	Construction (Temporary)
Secondary undifferentiated bedrock aquifer: Dolomitic siltstone of the Mercia Mudstone Group (moderate)	Cubbington cutting	Moderate adverse	Dewatering may reduce the groundwater levels within the aquifer. Potential for contaminants to enter groundwater during construction (e.g. suspended solids, leaks from machinery).	SuDS such as infiltration trenches will be located where gravity transfer is feasible to facilitate groundwater recharge. Contamination control measures as required by the draft CoCP Section 16.	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	Construction (Permanent)
Secondary B bedrock aquifer: Mudstone of the Mercia Mudstone Group (moderate)	Burton Green green tunnel; and Burton Green retaining structure.	Negligible	Not located within zone of influence therefore unlikely to receive adverse impacts from changes to groundwater.	None required	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	None

Groundwater receptor ²⁰ (and value ²¹)	Design element	Magnitude of impact (no mitigation)	Potential impact to groundwater	Avoidance and mitigation measures	Magnitude of remaining impact and effect	Other mitigation measures	Residual effect	Duration of effect
Secondary A superficial aquifer: Alluvium (moderate)	Glasshouse Wood cutting; Canley Brook viaduct; River Avon viaduct; Finham Brook viaduct; Worksites and construction compounds; and Construction traffic route.	Moderate adverse	<p>Located within the zone of influence therefore dewatering may reduce the groundwater levels within the aquifer.</p> <p>Potential for contaminants to enter groundwater during construction (e.g. suspended solids, leaks from machinery).</p> <p>Foundations required for viaducts have potential to alter groundwater flow regime; however, any change is likely to be localised and minimal.</p> <p>Reduced infiltration could locally reduce groundwater levels; however, this is likely to be minimal and temporary.</p>	<p>SuDS such as infiltration trenches will be located where gravity transfer is feasible to facilitate groundwater recharge.</p> <p>Contamination control measures as required by the draft CoCP Section 16.</p>	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	Construction (Permanent)

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Groundwater receptor ²⁰ (and value ²¹)	Design element	Magnitude of impact (no mitigation)	Potential impact to groundwater	Avoidance and mitigation measures	Magnitude of remaining impact and effect	Other mitigation measures	Residual effect	Duration of effect
	Stoneleigh Park retaining wall; and Canley Brook retaining wall.	Moderate adverse	Located within the zone of influence therefore dewatering may reduce the groundwater levels within the aquifer. Potential for contaminants to enter groundwater during construction (e.g. suspended solids, leaks from machinery).	SuDS such as infiltration trenches will be located where feasible to facilitate groundwater recharge. Mitigation via gravity transfer is not possible at this location; however, during the construction of the retaining walls dewatering will be required and therefore pumping will be in operation. As a result water can be transferred to the SuDS during the construction phase. Contamination control measures as required by the draft CoCP Section 16.	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	Construction (Permanent)
Secondary A superficial aquifer: River Terrace Deposits (moderate)	Cublington cutting; Stonehouse cutting; Glasshouse Wood cutting; Kenilworth cutting; River Avon viaduct; Finham Brook viaduct; Worksites and construction compounds; and Construction traffic route.	Moderate adverse	Located within the zone of influence therefore dewatering may reduce the groundwater levels within the aquifer. Potential for contaminants to enter groundwater during construction (e.g. suspended solids, leaks from machinery). Foundations required for viaducts have potential to alter groundwater flow regime; however, any change is likely to be	SuDS such as infiltration trenches will be located where gravity transfer is feasible to facilitate groundwater recharge. Contamination control measures as required by the draft CoCP Section 16.	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	Construction (Permanent)

Groundwater receptor ²⁰ (and value ²¹)	Design element	Magnitude of impact (no mitigation)	Potential impact to groundwater	Avoidance and mitigation measures	Magnitude of remaining impact and effect	Other mitigation measures	Residual effect	Duration of effect
			<p>localised and minimal.</p> <p>Reduced infiltration could locally reduce groundwater levels; however, this is likely to be minimal and temporary.</p>					
	Stoneleigh Park retaining wall	Moderate adverse	<p>Located within the zone of influence therefore dewatering may reduce the groundwater levels within the aquifer.</p> <p>Potential for contaminants to enter groundwater during construction (e.g. suspended solids, leaks from machinery).</p>	<p>SuDS such as infiltration trenches will be located where feasible to facilitate groundwater recharge. Mitigation via gravity transfer is not possible; however, during the construction of the retaining walls pumping will be in operation. As a result water can be transferred to the SuDS during construction phase.</p> <p>Contamination control measures as required by the draft CoCP Section 16.</p>	<p>Negligible</p> <p>Neutral</p> <p>(not significant)</p>	None required	<p>Negligible</p> <p>Neutral</p> <p>(not significant)</p>	Construction (Permanent)
Secondary A superficial aquifer: Bagington Sand and Gravel (moderate)	Glasshouse Wood cutting	Negligible	Not located within zone of influence therefore unlikely to receive adverse impacts from changes to groundwater.	None required	<p>Negligible</p> <p>Neutral</p> <p>(not significant)</p>	None required	<p>Negligible</p> <p>Neutral</p> <p>(not significant)</p>	None

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Groundwater receptor ²⁰ (and value ²¹)	Design element	Magnitude of impact (no mitigation)	Potential impact to groundwater	Avoidance and mitigation measures	Magnitude of remaining impact and effect	Other mitigation measures	Residual effect	Duration of effect
Unproductive superficial strata: Damicton Till and Diamicton of the Oadby Member (low)	Glasshouse Wood cutting; Worksites and construction compounds; Construction traffic route; Burton Green green tunnel; Burton Green retaining structure;; and Burton Green auto-transformer feeder station	Negligible	None from a groundwater perspective as the superficial deposits are unproductive strata and unlikely to be affected by changes in groundwater.	None required	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	None
Secondary A Superficial Aquifer: Glaciofluvial Deposits (moderate)	Burton Green retaining structure; Roughknowles Wood cutting; Kenilworth cutting; and Glasshouse Wood cutting.	Moderate adverse	Dewatering may reduce the groundwater levels within the aquifer. Potential for contaminants to enter groundwater during construction (e.g. suspended solids, leaks from machinery).	SuDS such as infiltration trenches will be located where gravity transfer is feasible to facilitate groundwater recharge. Contamination control measures as required by the draft CoCP Section 16.	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	Construction (Permanent)
Abstractions								
18/54/10/0133 Furzen Hill Farm Well 2 near Coventry Road (high) Map WR-02-018 (H5), 1.4km south-east of Stareton	Cubbington cutting	Negligible	Not located within zone of influence therefore unlikely to receive adverse impacts from changes to groundwater.	None required	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	None

Groundwater receptor ²⁰ (and value ²¹)	Design element	Magnitude of impact (no mitigation)	Potential impact to groundwater	Avoidance and mitigation measures	Magnitude of remaining impact and effect	Other mitigation measures	Residual effect	Duration of effect
18/54/10/0133 Furzen Hill Farm Well 1 near Coventry Road (high) Map WR-02-018 (H5), 1.4km south-east of Stareton	Cubbington cutting	Negligible	Not located within zone of influence therefore unlikely to receive adverse impacts from changes to groundwater.	None required	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	None
18/54/11/0098 (high) Near Crew Lane and Kenilworth Golf Club Map WR-02-018 (F6), 700m south-west of Finham Brook viaduct	Glasshouse Wood cutting	Negligible	Not located within zone of influence therefore unlikely to receive adverse impacts from changes to groundwater.	None required	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	None
Groundwater SPZ location (high) Map WR-02-018 (F6), near Mill End, Crackley	Canley Brook retaining wall	Negligible	Not located within zone of influence therefore unlikely to receive adverse impacts from changes to groundwater.	None required	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	None
Water dependent habitats								
Waverley and Weston Wood (high), 710m north-east of the route Adjacent to A445 Leicester Lane, 1.7km east of Stareton Map EC-01-047 (H2)	Cubbington cutting	Negligible	Not located within zone of influence therefore unlikely to receive adverse impacts from changes to groundwater.	None required	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	None

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Groundwater receptor ²⁰ (and value ²¹)	Design element	Magnitude of impact (no mitigation)	Potential impact to groundwater	Avoidance and mitigation measures	Magnitude of remaining impact and effect	Other mitigation measures	Residual effect	Duration of effect
<p>River Avon and tributaries LWS (moderate)</p> <p>Within the study area from Cubbington to Stoneleigh</p> <p>Map EC-01-047 and EC-01-048 (I5), will be crossed by the River Avon viaduct</p>	<p>Cubbington cutting;</p> <p>Stonehouse cutting;</p> <p>Glasshouse Wood cutting;</p> <p>Stoneleigh Park retaining wall;</p> <p>Agricultural Centre embankment;</p> <p>Glasshouse Wood embankment;</p> <p>River Avon viaduct;</p> <p>Realignment of Leicester Lane;</p> <p>Worksites and construction compounds; and</p> <p>Construction traffic route</p>	Moderate adverse	<p>The river is within the zone of influence. The potential reduction in groundwater levels may locally reduce the volume of water in the stream.</p> <p>Potential for contaminants to enter groundwater during construction (e.g. suspended solids, leaks from machinery).</p> <p>Reduced infiltration could locally reduce groundwater levels; however, this is likely to be minimal and temporary.</p> <p>Foundations required for viaducts have potential to alter groundwater flow regime; however, any change is likely to be localised and minimal.</p>	<p>SuDS in the form of infiltration trenches will be located at the northern end of Cubbington cutting, the southern end of Stonehouse cutting and the southern end of Glasshouse Wood cutting to facilitate groundwater recharge. They will also be located along the northern end and eastern edge of the retaining wall, where gravity transfer is not possible. During the construction of the retaining wall, pumping will be in operation for the dewatering required; therefore water can be transferred to the SuDS.</p> <p>Contamination control measures as required by the draft CoCP Section 16.</p>	<p>Negligible</p> <p>Neutral</p> <p>(not significant)</p>	None required	<p>Negligible</p> <p>Neutral</p> <p>(not significant)</p>	<p>Construction (Permanent)</p>
<p>Decoy Spinney (high), 450m south-west of the route</p> <p>Map EC-01-047 (E8), near Stone House Farm, 850m south-west of Stareton</p>	<p>Stonehouse cutting;</p> <p>Stoneleigh Park retaining wall</p>	Negligible	<p>Not located within zone of influence therefore unlikely to receive adverse impacts from changes to groundwater.</p>	None required	<p>Negligible</p> <p>Neutral</p> <p>(not significant)</p>	None required	<p>Negligible</p> <p>Neutral</p> <p>(not significant)</p>	None

Groundwater receptor ²⁰ (and value ²¹)	Design element	Magnitude of impact (no mitigation)	Potential impact to groundwater	Avoidance and mitigation measures	Magnitude of remaining impact and effect	Other mitigation measures	Residual effect	Duration of effect
Ticknell Spinney (high), 1,050m north-east of the route Map EC-01-047 (G2), adjacent to Coventry Road, 850m east of Stareton	Stonehouse cutting	Negligible	Not located within zone of influence therefore unlikely to receive adverse impacts from changes to groundwater.	None required	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	None
Bericote Wood (high), 1,000m south-west of the route. Adjacent to River Avon and B4113 Stoneleigh Road. Map EC-01-047 (D10), 980m south of River Avon viaduct	Stonehouse cutting; Stoneleigh Park retaining wall	Negligible	Not located within zone of influence therefore unlikely to receive adverse impacts from changes to groundwater.	None required	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	None
Motslow Hill Spinney (high), 460m north-east of the route Map EC-01-047 (B4), at Motslow Hill, 400m south of Stoneleigh	Stoneleigh Park retaining wall	Negligible	Not located within zone of influence therefore unlikely to receive adverse impacts from changes to groundwater.	None required	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	None
Glasshouse Spinney and Glasshouse Wood (high), 920m south-west of the route Map EC-01-048 (H10), 950m south-west of River Avon viaduct	Glasshouse Wood cutting	Negligible	Not located within zone of influence therefore unlikely to receive adverse impacts from changes to groundwater.	None required	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	None

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Groundwater receptor ²⁰ (and value ²¹)	Design element	Magnitude of impact (no mitigation)	Potential impact to groundwater	Avoidance and mitigation measures	Magnitude of remaining impact and effect	Other mitigation measures	Residual effect	Duration of effect
Kings Wood (high), 530m north-east of the route Map EC-01-048 (H3), 655m north of River Avon viaduct	Glasshouse Wood cutting; Coventry Road compound	Negligible	Not located within zone of influence therefore unlikely to receive adverse impacts from changes to groundwater. Receptor assessed unlikely to be groundwater dependent as located on elevated topography with no groundwater features present.	None required	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	None
Knowle Hill LNR (high), 940m south-west of the route Map EC-01-048 (D10), 960m south-west of Finham Brook viaduct	Glasshouse Wood cutting; Finham Brook viaduct	Negligible	Not located within zone of influence therefore unlikely to receive adverse impacts from changes to groundwater.	None required	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	None

Groundwater receptor ²⁰ (and value ²¹)	Design element	Magnitude of impact (no mitigation)	Potential impact to groundwater	Avoidance and mitigation measures	Magnitude of remaining impact and effect	Other mitigation measures	Residual effect	Duration of effect
<p>Finham Brook (moderate)</p> <p>Alongside Dalehouse Lane, near Kenilworth</p> <p>Map EC-01-048 (E6) crossed by Finham Brook viaduct</p>	<p>Glasshouse Wood cutting;</p> <p>Kenilworth cutting;</p> <p>Dalehouse embankment;</p> <p>Realignment of Dalehouse Lane;</p> <p>Construction traffic route;</p> <p>Worksite and construction compounds; and</p> <p>Finham Brook viaduct</p>	Moderate adverse	<p>The brook is within the zone of influence. The potential reduction in groundwater levels may locally reduce the volume of water in the stream.</p> <p>Potential for contaminants to enter groundwater during construction (e.g. suspended solids, leaks from machinery).</p> <p>Reduced infiltration could locally reduce groundwater levels; however, this is likely to be minimal and temporary.</p> <p>Foundations required for viaducts have potential to alter groundwater flow regime; however, any change is likely to be localised and minimal.</p>	<p>SuDS in the form of infiltration trenches will be located at the northern end of Glasshouse Wood cutting and the southern end of Kenilworth cutting to facilitate groundwater recharge.</p> <p>Contamination control measures as required by the draft CoCP Section 16.</p>	<p>Negligible</p> <p>Neutral</p> <p>(not significant)</p>	None required	<p>Negligible</p> <p>Neutral</p> <p>(not significant)</p>	Construction (Permanent)

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Groundwater receptor ²⁰ (and value ²¹)	Design element	Magnitude of impact (no mitigation)	Potential impact to groundwater	Avoidance and mitigation measures	Magnitude of remaining impact and effect	Other mitigation measures	Residual effect	Duration of effect
Canley Brook (moderate), will be crossed by the route Map EC-01-048 (B7), near Crackley	Kenilworth cutting; Canley Brook retaining wall; Crackley Road Cutting; Canley Brook viaduct; North Crackley cutting; Crackley Wood embankment; Roughknowles Wood cutting; Worksites and construction compounds; Construction traffic route and bridge; Utilities; and Road realignments	Major adverse	Canley Brook is to be realigned where it will follow a new flood relief drainage channel to be crossed by Canley viaduct. The brook is within the zone of influence. The potential reduction in groundwater levels may locally reduce the volume of water in the stream. Potential for contaminants to enter groundwater during construction (i.e. suspended solids, leaks from machinery). Reduced infiltration could locally reduce groundwater levels; however, this is likely to be minimal and temporary. Foundations required for viaducts have potential to alter groundwater flow regime; however, any change is likely to be localised and minimal.	SuDS in the form of infiltration trenches will be located at the southern end of Crackley Road cutting, and the northern end of North Crackley cutting to facilitate groundwater recharge. Contamination control measures as required by the draft CoCP Section 16.	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	Construction (Permanent)

Groundwater receptor ²⁰ (and value ²¹)	Design element	Magnitude of impact (no mitigation)	Potential impact to groundwater	Avoidance and mitigation measures	Magnitude of remaining impact and effect	Other mitigation measures	Residual effect	Duration of effect
Kenilworth Common (high), 800m south-west of the route In Crackley Map EC-01-048 (C10) 880m south of Canley Brook viaduct	Kenilworth cutting; Canley Brook retaining wall	Negligible	Not located within zone of influence therefore unlikely to receive adverse impacts from changes to groundwater.	None required	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	None
Wainbody Wood, Stivichall Common, Kenilworth Road Spinney LNR and Wainbody Wood North LWS (high), 370m north-east of the route Map EC-01-048 (B1), 1.5km north-east of Canley Brook viaduct	Canley Brook retaining wall	Negligible	Not located within zone of influence therefore unlikely to receive adverse impacts from changes to groundwater.	None required	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	None
Tocil Wood and Brookstray LWS, ancient woodland and Tocil Wood & Meadow LNR (high), 1,300m north-east of the route Map EC-01-049 (H1), 780m north-west of Gibbett Hill	Canley Brook retaining wall; Crackley Road cutting; Canley Brook viaduct; North Crackley cutting; and Crackley Wood embankment	Negligible	Not located within zone of influence therefore unlikely to receive adverse impacts from changes to groundwater.	None required	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	None

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Groundwater receptor ²⁰ (and value ²¹)	Design element	Magnitude of impact (no mitigation)	Potential impact to groundwater	Avoidance and mitigation measures	Magnitude of remaining impact and effect	Other mitigation measures	Residual effect	Duration of effect
Crackley Wood Ancient woodland, LWS and LNR (high), will be crossed by the route 780m north of Kenilworth Map EC-01-049 (H8)	Crackley Road cutting; Canley Brook viaduct; North Crackley cutting; Crackley Wood embankment; Roughknowles Wood cutting; Construction traffic route; Worksites and construction compounds; Crackley Lane realignment; and Crackley Wood culvert	Moderate adverse	Though there will be a partial loss of the receptor to the Proposed Scheme, should the remainder of the woodland be retained it is within the zone of influence and therefore dewatering could reduce groundwater levels which may have an adverse impact on the woodland. The issues that potentially supply the receptor are marginally outside the zone of influence and may be reduced, though they are to be culverted beneath the Proposed Scheme. Reduced infiltration could locally reduce groundwater levels; however, this is likely to be minimal and temporary.	SuDS in the form of infiltration trenches will be located at the northern end of North Crackley cutting and southern end of Roughknowles Wood cutting to facilitate groundwater recharge. Contamination control measures as required by the draft CoCP Section 16.	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	Construction (Permanent)
Whitefield Coppice (high), 700m north-east of the route Map EC-01-049 (F3), 1.3km north-west of Canley Brook viaduct	Roughknowles Wood cutting	Negligible	Not located within zone of influence therefore unlikely to receive adverse impacts from changes to groundwater.	None required	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	None

Groundwater receptor ²⁰ (and value ²¹)	Design element	Magnitude of impact (no mitigation)	Potential impact to groundwater	Avoidance and mitigation measures	Magnitude of remaining impact and effect	Other mitigation measures	Residual effect	Duration of effect
Rough Knowles Wood (high), 100m north-east of the route Map EC-01-049 (F5), 1.2km north-west of Canley Brook viaduct	Roughknowles Wood cutting; Realignment of Cryfield Grange Road; and Worksite and construction compound	Negligible	Located within the zone of influence. Receptor assessed unlikely to be groundwater dependent as located on elevated topography with no groundwater features present.	None Required	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	None
Broadwells Wood (high), will be crossed by the route Map EC-01-049 (D5) 1.1km south-east of Burton Green green tunnel	Broadwells Wood embankment; Construction traffic route; Road realignments; Worksite and construction compound; Stockpile; and Broadwells Wood culvert	Minor adverse	Though there will be a partial loss of the receptor to the Proposed Scheme, should the remainder of the woodland be retained it is likely to be impacted by the design elements listed as they have the potential to be a contamination source. Reduced infiltration could locally reduce groundwater levels; however, this is likely to be minimal and temporary. Issues potentially sourcing the receptor are to be culverted under the scheme.	SuDS in the form of swales will be located alongside Broadwells Wood embankment, where it crosses the woodland to prevent contamination from the scheme. Contamination control measures as required by the draft CoCP Section 16.	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	Construction (Permanent)

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Groundwater receptor ²⁰ (and value ²¹)	Design element	Magnitude of impact (no mitigation)	Potential impact to groundwater	Avoidance and mitigation measures	Magnitude of remaining impact and effect	Other mitigation measures	Residual effect	Duration of effect
Long Meadow Wood (high), 760m south-west of the route Map EC-01-049 (C10), 1.1km south-east of Burton Green green tunnel	Broadwells Wood embankment	Negligible	Not located within zone of influence therefore unlikely to receive adverse impacts from changes to groundwater.	None required	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	None
The Pools Wood (moderate), 730m north-east of the route Map EC-01-049 (C3), 1.1km east of Burton Green green tunnel	Broadwells Wood embankment; Bockenden cutting	Negligible	Not located within zone of influence therefore unlikely to receive adverse impacts from changes to groundwater.	None required	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	None
Stoneymoor Wood (high), 720m south-west of the route Map EC-01-049 (A10), 530m south-west of Burton Green green tunnel	Bockenden cutting	Negligible	Not located within zone of influence therefore unlikely to receive adverse impacts from changes to groundwater.	None required	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	None

Groundwater receptor ²⁰ (and value ²¹)	Design element	Magnitude of impact (no mitigation)	Potential impact to groundwater	Avoidance and mitigation measures	Magnitude of remaining impact and effect	Other mitigation measures	Residual effect	Duration of effect
Black Waste Wood (high), will be crossed by the route Map EC-01-050a (I5) 60m east of Burton Green green tunnel	Black Waste Wood embankment; Black Waste Wood culvert; Burton Green South cutting; Burton Green green tunnel; Worksite and construction compound; Construction traffic route; and Road realignments	Moderate adverse	Though there is a partial loss of the receptor to the scheme, should the remainder of the woodland be retained, it is in the zone of influence and therefore dewatering could reduce groundwater levels which may have an adverse impact on the woodland. The issues that potentially source the receptor are also within the zone of influence and may be reduced, though they are to be culverted beneath the Proposed Scheme. Reduced infiltration could locally reduce groundwater levels; however, this is likely to be minimal and temporary.	SuDS in the form of infiltration trenches will be located at the southern end of Burton Green green tunnel to facilitate groundwater recharge. Contamination control measures as required by the draft CoCP Section 16.	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	Construction (Permanent)

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Groundwater receptor ²⁰ (and value ²¹)	Design element	Magnitude of impact (no mitigation)	Potential impact to groundwater	Avoidance and mitigation measures	Magnitude of remaining impact and effect	Other mitigation measures	Residual effect	Duration of effect
Big Poors and Little Poors Wood (moderate), 10m south-west of the route Map EC-01-050a (H7), 340m south-west of Burton Green green tunnel	Burton Green green tunnel.	Minor adverse	Though located within the zone of influence with additional design features potentially impacting the receptor, the receptor is located on unproductive superficial deposits and therefore impacts from changes in groundwater quantity or quality are likely to be minimal.	None required	Minor Slight (not significant)	None required	Minor Slight (not significant)	Construction (Permanent)
Beanit Farm Hedge (moderate), 90m south-west of the route Map EC-01-050a (F7), 730m north-west of Burton Green green tunnel	Burton Green retaining structure.	Negligible	Receptor assessed unlikely to be groundwater dependent as located on unproductive superficial deposits.	None required	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	None
Little Beanit Farm Meadow (moderate), 350m south-west of the route Map EC-01-050a (E8), 640m north-west of Burton Green green tunnel	Burton Green retaining structure.	Negligible	Not located within zone of influence therefore unlikely to receive adverse impacts from changes to groundwater.	None required	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	None

Groundwater receptor ²⁰ (and value ²¹)	Design element	Magnitude of impact (no mitigation)	Potential impact to groundwater	Avoidance and mitigation measures	Magnitude of remaining impact and effect	Other mitigation measures	Residual effect	Duration of effect
Surface water and groundwater interaction								
Stream along Leicester Lane, 200m north-east of the route (moderate) WR-02-018 (H5), 1.1km south-east of Stareton	Cubbington cutting; Cubbington embankment; Realignment of Leicester Lane.	Minor adverse	Not located within zone of influence therefore unlikely to receive adverse impacts from changes to groundwater. Reduced infiltration could locally reduce groundwater levels; however, this is likely to be minimal and temporary.	None required	Minor Slight (not significant)	None required	Minor Slight (not significant)	Construction (Permanent)
Pond, near Furzen Hill Farm, adjacent to Coventry Road, 340m north-east of the route (low) Map EC-04-047 (I5), 1.6km south-east of Stareton	Cubbington cutting; Realignment of Coventry Road.	Negligible	Receptor assessed unlikely to be groundwater dependent as located on elevated topography, adjacent to a road.	None required	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	None
Pond, near Furzen Hill Farm, 100m north-east of the route (low) Map EC-04-047 (H6), 1.6km south-east of Stareton	Cubbington cutting; Stockpile adjacent.	Negligible	Receptor assessed unlikely to be groundwater dependent as located on elevated topography.	None required	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	None

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Groundwater receptor ²⁰ (and value ²¹)	Design element	Magnitude of impact (no mitigation)	Potential impact to groundwater	Avoidance and mitigation measures	Magnitude of remaining impact and effect	Other mitigation measures	Residual effect	Duration of effect
Pond, near Leicester Lane, 160m south-west of the route (low) Map EC-04-047 (H7), 1.4km south of Stareton	Cubbington cutting; Earthworks adjacent	Major adverse	Pond assumed to be removed during construction of the Proposed Scheme.	Refer to Ecology Volume 2, CFA Report 18, Section 7				
Pond, 145m north-east of the route (low) Map EC-04-047 (G6), 1km south of Stareton	Cubbington cutting	Major adverse	Pond assumed to be removed during construction of the Proposed Scheme.	Refer to Ecology Volume 2, CFA Report 18, Section 7				
Two ponds near Stonehouse Farm, 165m south-west of the route (low) Identifiers: 030-AA-137001 and 030-AA-137003 Map EC-04-047 (F7), 880m south of Stareton	Cubbington cutting; Utility diversions adjacent.	Negligible	Receptor assessed unlikely to be groundwater dependent as located on elevated topography.	None required	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	None
Pond, 150m south-west of the route (low) Map EC-04-047 (D7), 650m south-west of Stareton	Stoneleigh Park retaining wall	Moderate adverse	Located within the zone of influence therefore dewatering could reduce groundwater levels which may have an adverse impact on the pond.	None required	Moderate Slight (not significant)	None required	Moderate Slight (not significant)	Construction (Temporary)

Groundwater receptor ²⁰ (and value ²¹)	Design element	Magnitude of impact (no mitigation)	Potential impact to groundwater	Avoidance and mitigation measures	Magnitude of remaining impact and effect	Other mitigation measures	Residual effect	Duration of effect
Issues at Hares Parlour near B4113 Stoneleigh Road, 300m south-west of the route (moderate) Map WR-02-018 (G6), 780m west of Stareton	Stoneleigh Park retaining wall	Negligible	Not located within zone of influence therefore unlikely to receive adverse impacts from changes to groundwater.	None required	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	None
Sinks and Issues, west of Hares Parlour, 520m south-west of the route (moderate) Map WR-02-018 (G6), 900m south-west of Stareton	Stoneleigh Park retaining wall	Negligible	Not located within zone of influence therefore unlikely to receive adverse impacts from changes to groundwater.	None required	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	None
Pond at northern edge of Stoneleigh Park, 125m north-east of the route (low) Map EC-04-047 (B6), 300m south-east of River Avon viaduct	Stoneleigh Park retaining wall; New water main	Moderate adverse	Located within the zone of influence therefore dewatering could reduce groundwater levels which may have an adverse impact on the pond.	None required	Moderate Slight (not significant)	None required	Moderate Slight (not significant)	Construction (Temporary)
Issues, near Glasshouse Wood, 1,350m south-west of the route (moderate) Map WR-02-018 (G6) 1.35km south-west of River Avon viaduct	Glasshouse Wood embankment	Negligible	Not located within zone of influence therefore unlikely to receive adverse impacts from changes to groundwater.	None required	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	None

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Groundwater receptor ²⁰ (and value ²¹)	Design element	Magnitude of impact (no mitigation)	Potential impact to groundwater	Avoidance and mitigation measures	Magnitude of remaining impact and effect	Other mitigation measures	Residual effect	Duration of effect
Spring, adjacent to River Sowe, 500m north-east of the route (moderate) Map WR-02-018 (G5) 500m north-east of River Avon viaduct	Glasshouse Wood embankment	Negligible	Not located within zone of influence therefore unlikely to receive adverse impacts from changes to groundwater.	None required	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	None
Pond, 110m north-east of the route (low) Map EC-04-048 (G5), 700m north-west River Avon viaduct	Glasshouse Wood cutting	Major adverse	Pond assumed to be removed during construction of the Proposed Scheme.	Refer to Ecology Volume 2, CFA Report 18, Section 7				
Issues near Crewe Gardens, 1,050m south-west of the route (moderate) Map WR-02-018 (F6) 1.3km west of River Avon viaduct	Glasshouse Wood cutting	Negligible	Not located within zone of influence therefore unlikely to receive adverse impacts from changes to groundwater.	None required	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	None
Pond near Kingswood Farmhouse, 155m north-east of the route (low) Map EC-04-048 (G5), 920m north-west of River Avon viaduct	Glasshouse Wood cutting	Moderate adverse	Located within the zone of influence therefore dewatering could reduce groundwater levels which may have an adverse impact on the pond.	None Required	Moderate Slight (not significant)	None required	Moderate Slight (not significant)	Construction (Permanent)

Groundwater receptor ²⁰ (and value ²¹)	Design element	Magnitude of impact (no mitigation)	Potential impact to groundwater	Avoidance and mitigation measures	Magnitude of remaining impact and effect	Other mitigation measures	Residual effect	Duration of effect
Pond near new Kingswood Farm, 145m south-west of the route (low) Identifier 030-AA-141003 Map EC-04-048 (F6), 280m south of Finham Brook viaduct	Glasshouse Wood cutting	Negligible	Receptor assessed unlikely to be groundwater dependent as located on elevated topography.	None required	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	None
Pond, near Dalehouse Lane, 150m north-east of the route (low) Map EC-04-048 (F5), 220m east of Finham Brook viaduct	Glasshouse Wood cutting; Ecological mitigation area adjacent	Moderate adverse	Located within the zone of influence therefore dewatering could reduce groundwater levels which may have an adverse impact on the pond.	None required	Moderate Slight (not significant)	None required	Moderate Slight (not significant)	Construction (Permanent)
Two ponds, near Dalehouse Farm, less than 50m south-west of the route (low) Map EC-04-048 (D6), 250m north-west of Finham Brook viaduct	Kenilworth cutting	Major adverse	Ponds assumed to be removed during construction of the Proposed Scheme.	Refer to Ecology Volume 2, CFA Report 18, Section 7				
Pond near Dalehouse Farm, 80m south west of the route (low) Map EC-04-048 (D6), 330m north-west of Finham Brook viaduct	Kenilworth cutting; Canley Brook retaining wall	Negligible	Receptor assessed unlikely to be groundwater dependent as located on elevated topography.	None required	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	None

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Groundwater receptor ²⁰ (and value ²¹)	Design element	Magnitude of impact (no mitigation)	Potential impact to groundwater	Avoidance and mitigation measures	Magnitude of remaining impact and effect	Other mitigation measures	Residual effect	Duration of effect
<p>Pond, near Dalehouse Farm, less than 60m north-east of the route (low)</p> <p>Identifier 030-AA-141002</p> <p>Map EC-04-048 (D6), 400m north-west of Finham Brook viaduct</p>	<p>Kenilworth cutting;</p> <p>Canley Brook retaining wall</p>	Major adverse	Ponds assumed to be removed during construction of the Proposed Scheme.	Refer to Ecology Volume 2, CFA Report 18, Section 7				
<p>Pond, near Dalehouse Farm, 115m south-west of the route (low)</p> <p>Map EC-04-048 (D7), 420m north-west of Finham Brook viaduct</p>	<p>Kenilworth cutting;</p> <p>Canley Brook retaining wall</p>	Major adverse	Pond not found during Phase 1 Survey and therefore not assessed further.	Refer to Ecology Volume 2, CFA Report 18, Section 7.				
<p>Pond, near Milburn Grange, 100m south-west of the route (low)</p> <p>Map EC-04-048 (D7), 550m north-west of Finham Brook viaduct</p>	<p>Canley Brook retaining wall</p>	Major adverse	Pond not found during Phase 1 Survey and therefore not assessed further.	Refer to Ecology Volume 2, CFA Report 18, Section 7.				

Groundwater receptor ²⁰ (and value ²¹)	Design element	Magnitude of impact (no mitigation)	Potential impact to groundwater	Avoidance and mitigation measures	Magnitude of remaining impact and effect	Other mitigation measures	Residual effect	Duration of effect
Two ponds, adjacent to Coventry to Leamington Spa Line, 50m north-east of the route (low) Map EC-04-048 (C6), near Coventry-Leamington Spa Line Overbridge	Canley Brook retaining wall	Major adverse	Ponds assumed to be removed during construction of the Proposed Scheme. Pond not found during Phase 1 Survey and therefore not assessed further.	Refer to Ecology Volume 2, CFA Report 18, Section 7.				
Issues in Crackley, 385m south-west of the route (moderate) Map WR-02-018 (E6)	Crackley Road cutting	Negligible	Not located within zone of influence therefore unlikely to receive adverse impacts from changes to groundwater. Receptor assessed unlikely to be groundwater dependent as appears to be a culvert.	None required	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	None
Issues 180m south-west of Cryfield Grange, 410m north-east of the route (moderate) Map WR-02-018 (E5)	Crackley Road cutting	Negligible	Not located within zone of influence therefore unlikely to receive adverse impacts from changes to groundwater.	None required	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	None

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Groundwater receptor ²⁰ (and value ²¹)	Design element	Magnitude of impact (no mitigation)	Potential impact to groundwater	Avoidance and mitigation measures	Magnitude of remaining impact and effect	Other mitigation measures	Residual effect	Duration of effect
Issues near Crackley Farm, 680m south-west of the route (moderate) Map WR-02-018 (E6) 700m south-west of Canley Brook viaduct	Crackley Road cutting	Negligible	Not located within zone of influence therefore unlikely to receive adverse impacts from changes to groundwater.	None required	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	None
Stream, will be crossed by the route (moderate) Map WR-02-018 (E6), 320m north-west of Canley Brook viaduct	Crackley Wood embankment; Culvert; Construction traffic route	Moderate adverse	Located within the zone of influence therefore dewatering could reduce groundwater levels which may have an adverse impact on the watercourse Reduced infiltration could locally reduce groundwater levels; however, this is likely to be minimal and temporary.	SuDS in the form of infiltration trenches will be located at the northern end of North Crackley cutting and southern end of Roughknowles Wood cutting to facilitate groundwater recharge. Contamination control measures as required by the draft CoCP Section 16.	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	Construction (Permanent)
Issues near Crackley Wood, 250m south-west of the route (moderate) Map: WR-02-018 (E6), 640m west of Canley Brook viaduct	Roughknowles Wood cutting	Negligible	Not located within zone of influence therefore unlikely to receive adverse impacts from changes to groundwater.	None required	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	None

Groundwater receptor ²⁰ (and value ²¹)	Design element	Magnitude of impact (no mitigation)	Potential impact to groundwater	Avoidance and mitigation measures	Magnitude of remaining impact and effect	Other mitigation measures	Residual effect	Duration of effect
Issues near Hollis Lane, 400m south-west of the route (moderate) Map: WR-02-018 (E6), 1.25km north of Kenilworth	Roughknowles Wood cutting	Negligible	Not located within zone of influence therefore unlikely to receive adverse impacts from changes to groundwater. Receptor assessed unlikely to be groundwater dependent as appears to be a culvert.	None required	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	None
Two ponds near South Hurst Farm, will be crossed by the route (low) Map EC-04-049 (E7), 1.3km north-west of Canley Brook viaduct	Roughknowles Wood cutting	Major adverse	Ponds assumed to be removed during construction of the Proposed Scheme.	Refer to Ecology Volume 2, CFA Report 18, Section 7				
Pond, 200m south-west of the route (low) Map EC-04-049 (E8), 120m south of Broadwells Wood	Broadwells Wood embankment	Major adverse	Ponds assumed to be removed during construction of the Proposed Scheme.	Refer to Ecology Volume 2, CFA Report 18, Section 7				
Issues 200m west of Red Lane Farm, 1,100m south-west of the route (moderate) Map WR-02-018 (D7), 1.8km south-east of Burton Green	Broadwells Wood embankment	Negligible	Not located within zone of influence therefore unlikely to receive adverse impacts from changes to groundwater.	None required	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	None

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Groundwater receptor ²⁰ (and value ²¹)	Design element	Magnitude of impact (no mitigation)	Potential impact to groundwater	Avoidance and mitigation measures	Magnitude of remaining impact and effect	Other mitigation measures	Residual effect	Duration of effect
Stream at Broadwells Wood, will be crossed by the route (moderate) Map WR-02-018 (D6), 1.3km south-east of Burton Green	Broadwells Wood embankment; Culverts; Worksite and construction compound; Construction traffic route; Footpath realignment; Stockpile	Minor adverse	Not located within zone of influence therefore unlikely to receive adverse impacts from changes to groundwater Reduced infiltration could locally reduce groundwater levels; however, this is likely to be minimal and temporary. Stream to be culverted beneath proposed scheme.	None required	Minor Slight (not significant)	None required	Minor Slight (not significant)	Construction (Permanent)
Spring at The Pools, 900m north-east of the route (moderate) Map WR-02-018 (D6), 1.2km east of Burton Green	Broadwells Wood embankment	Negligible	Not located within zone of influence therefore unlikely to receive adverse impacts from changes to groundwater.	None required	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	None
Pond, 150m north-east of the route (low) Map EC-04-049 (C6), 840m south-east of Burton Green	Broadwells Wood embankment; Footpath realignment; Earthworks	Major adverse	Pond assumed to be removed during construction of the Proposed Scheme.	Refer to Ecology Volume 2, CFA Report 18, Section 7				

Groundwater receptor ²⁰ (and value ²¹)	Design element	Magnitude of impact (no mitigation)	Potential impact to groundwater	Avoidance and mitigation measures	Magnitude of remaining impact and effect	Other mitigation measures	Residual effect	Duration of effect
Issues at Bockenden Grange Farm, 400m north-east of the route (moderate) Map WR-02-018 (D6), 670m south-east of Burton Green	Bockenden cutting	Negligible	Not located within zone of influence therefore unlikely to receive adverse impacts from changes to groundwater.	None required	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	None
Issues at Dixons Farm, 1,200m north-east of the route (moderate) Map WR-02-018 (D5), 1.1km north-east of Burton Green	Bockenden cutting	Negligible	Not located within zone of influence therefore unlikely to receive adverse impacts from changes to groundwater.	None required	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	None
Pond, 50m south-west of the route (low) Map EC-04-050b (I6), Burton Green	Burton Green green tunnel	Major adverse	Pond assumed to be removed during construction of the Proposed Scheme.	Refer to Ecology Volume 2, CFA Report 18, Section 7				

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Groundwater receptor ²⁰ (and value ²¹)	Design element	Magnitude of impact (no mitigation)	Potential impact to groundwater	Avoidance and mitigation measures	Magnitude of remaining impact and effect	Other mitigation measures	Residual effect	Duration of effect
Issues and watercourse near Black Waste Wood, 180m south-west of the route, issues will be crossed by the route (moderate) Map WR-02-018 (D6), Burton Green	Burton Green green tunnel; Culvert; Worksite; Construction traffic route	Moderate adverse	Located within the zone of influence therefore dewatering could reduce groundwater levels which may have an adverse impact on the issues and watercourse. Reduced infiltration could locally reduce groundwater levels; however, this is likely to be minimal and temporary.	SuDS in the form of infiltration trenches will be located at the southern end of Burton Green green tunnel to facilitate groundwater recharge. Contamination control measures as required by the draft CoCP Section 16.	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	Construction (Permanent)
Issues, 610m south-west of the route (moderate) Map WR-02-018 (D6), Burton Green	Burton Green green tunnel	Negligible	Not located within zone of influence therefore unlikely to receive adverse impacts from changes to groundwater.	None required	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	None
Pond, 85m south-west of the route (low) Map EC-04-050b (H7), Burton Green	Burton Green green tunnel	Major adverse	Pond assumed to be removed during construction of the Proposed Scheme.	Refer to Ecology Volume 2, CFA Report 18, Section 7				
Pond, 100m south-west of the route (low) Map EC-04-050b (G7), 480m north-west of Burton Green	Burton Green retaining structure	Major adverse	Pond assumed to be removed during construction of the Proposed Scheme.	Refer to Ecology Volume 2, CFA Report 18, Section 7				

Groundwater receptor ²⁰ (and value ²¹)	Design element	Magnitude of impact (no mitigation)	Potential impact to groundwater	Avoidance and mitigation measures	Magnitude of remaining impact and effect	Other mitigation measures	Residual effect	Duration of effect
Pond, 85m south-west of the route (low) Map EC-04-050b (G6), 630m north-west of Burton Green	Burton Green retaining structure	Major adverse	Pond assumed to be removed during construction of the Proposed Scheme.	Refer to Ecology Volume 2, CFA Report 18, Section 7				
Issues north of The Neuk, 710m south-west of the route (moderate) Map WR-02-018 (C6), 330m south-east of Catchems Corner	Burton Green retaining structure	Negligible	Not located within zone of influence therefore unlikely to receive adverse impacts from changes to groundwater.	None required	Negligible Neutral (not significant)	None required	Negligible Neutral (not significant)	None

5 References

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